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Curator

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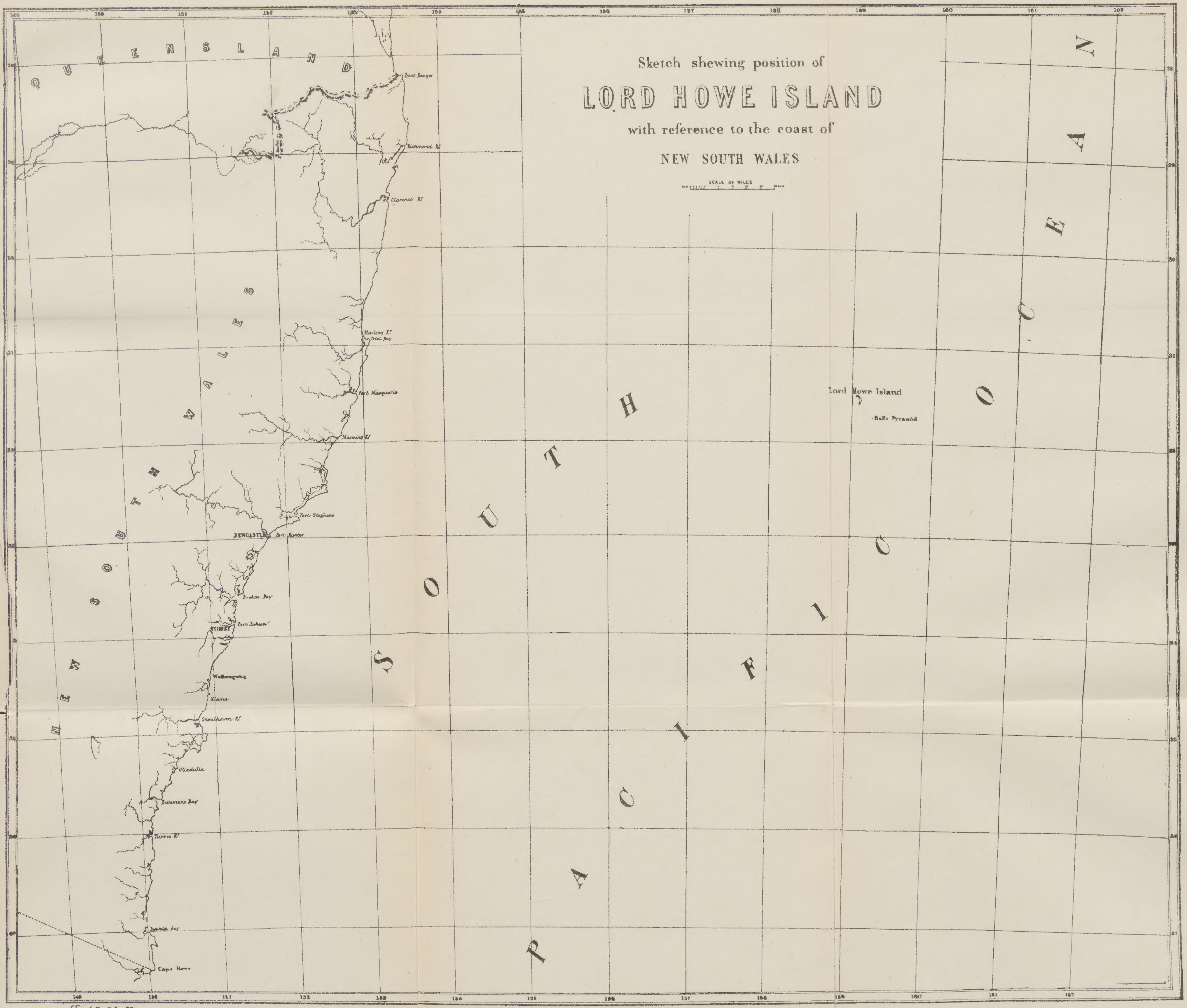

Sketch shewing position of

LORD HOWE ISLAND

with reference to the coast of

NEW SOUTH WALES

(Sig 5e 26-88)

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,
SYDNEY, NEW SOUTH WALES.

Transmitted to the Hon. J. B. Wilson with my Report dated 6th May 1882

Wm. J Conder

Superintendent of Trig. Survey

THE AUSTRALIAN MUSEUM, SYDNEY, New South Wales

MEMOIRS, No. 2.

LORD HOWE ISLAND.

ITS

Zoology, Geology, and Physical Characters.

PRINTED BY ORDER OF THE TRUSTEES,
E. P. RAMSAY, Curator.

c.

SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER.

1889.

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1879, July 16.

Bequest of Horace Smith.

PREFACE.

THE present work has a twofold object. It is intended, in the first place, to record the proceedings of a Collecting Party despatched by order of the Trustees to Lord Howe Island in August-September, 1887, and to give descriptions of the specimens so obtained; and secondly, to give an epitome of the general Zoology of the Island, so far as is at present known. From its geographical position, and from the fact that it forms the farthest outlying portion of the territory of New South Wales, a more detailed examination of its fauna than had hitherto been made was deemed desirable.

The determination and description of the collections has been effected by the Museum Staff, with the exception of the rock specimens, which have been obligingly described for the Trustees by Mr. T. W. Edgeworth David, of the Geological Survey of New South Wales.

In 1882 Mr. Alexander Morton, then of this Museum, visited Lord Howe Island for a brief period, and made sundry collections. A description of these is included in the present work, with previous gatherings, chiefly entomological, made by Mr. George Masters, late of the Australian Museum, in 1869; and also that of purchases made from Mr. E. H. Saunders, a collector who spent some time on the Island since the return of the Museum Party.

From unavoidable causes the descriptive account of the Mollusca is not yet ready for publication, although the plates are issued in advance. The former will appear subsequently as a second part of this Memoir.

A description of the remains of the extinct *Meiolania* is also for the present postponed. The Museum is gradually acquiring an extensive series of its bones, and it is intended, at a future date, to issue a separate Memoir dealing with this interesting Reptile.

The work of general Editor has been performed by Mr. Etheridge, under my supervision.

ED. P. RAMSAY,
Curator.

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130	78	,,	grand-mass	,,	ground-mass.
Plate i.		,,	Phæton	,,	Phaëton.

N.B.—Plates iv. and v.:—The figures on these plates have been reversed.

CONTENTS.

PAGE.
General Zoology; by R. Etheridge, junr. 1
Oology; by A. J. North, F.L.S. 43
Reptiles and Fishes; by J. Douglas Ogilby, F.L.S. 49
Insects; by A. Sidney Olliff, F.E.S. 75
Geology and Physical Structure; by R. Etheridge, junr. 99
Notes on Rock Specimens; by T. W. Edgeworth David, B.A., F.G.S. 127

LIST OF PLATES.

✓FRONTISPIECE—Sketch showing position of Lord Howe Island with reference to the Coast of New South Wales.

✓Plate I.—Eggs, described by Mr. A. J. North.

✓Plate II.—Fishes, described by Mr. J. Douglas Ogilby.

Plate III.—Do do do

✓Plate IV.—Mollusca, to be described by Mr. John Brazier.

✓Plate V.—Do do do

Plate VI.—Insects, described by Mr. A. Sidney Olliff.

Plate VII.—Sketch-section of the Coral-sand rock.

Plate VIII.—Chart of Lord Howe Island, by Lieut. Henry Ledgbird Ball, 1788.

Plate IX.—Chart of Lord Howe Island, by H. F. White, Assistant-Surveyor, 1835.

Plate X.—Geological sketch-map of Lord Howe Island, &c., by the late H. T. Wilkinson, J.P., Visiting Magistrate.

No. 1.

THE GENERAL ZOOLOGY OF LORD HOWE ISLAND.

BY

R. ETHERIDGE, Junr.

(Palæontologist to the Australian Museum, and Geological Survey of New South Wales).

CONTAINING ALSO

AN ACCOUNT OF THE COLLECTIONS MADE BY THE AUSTRALIAN MUSEUM COLLECTING PARTY, AUG.-SEPT., 1887.

THE GENERAL ZOOLOGY OF LORD HOWE ISLAND;

CONTAINING ALSO

AN ACCOUNT OF THE COLLECTIONS MADE BY THE AUSTRALIAN MUSEUM COLLECTING PARTY, AUG.-SEPT., 1887.

In August last (1887) I was instructed by Dr. E. P. Ramsay, Curator of the Australian Museum, to proceed in company with Messrs. J. A. Thorpe, and T. Whitelegge, to Lord Howe Island. Our instructions were to investigate the general zoology, geology, and palæontology of that little known and interesting island, aptly termed the "Madeira of the Pacific."

In the present Report I have endeavoured to point out what has been accomplished by observers in the past, and to place on record our mutually accumulated notes during a three weeks' residence on the island.

A Preliminary Report of our proceedings has already been published;[*] it will, therefore, be unnecessary to recapitulate our daily movements and method of procedure. Mention may, however, be made of the assistance we received from Mr. H. A. Unwin, of the Chief Secretary's office, who, although on his way to Norfolk Island, remained the whole time at Lord Howe, and made one of our party, working and collecting with us. The collections have been determined by the Australian Museum staff as below mentioned, viz.:—

The Aves and Echinodermata, by Dr. E. P. Ramsay.
Reptilia and Pisces, by Mr. J. Douglas Ogilby.
Mollusca, by Mr. J. Brazier.
Insecta, &c., by Mr. A. S. Olliff.
Polyzoa,
Crustacea,
Actinozoa,
Protozoa, } by Mr. T. Whitelegge.

New species, or any known forms meriting special notice, will be described.

Lord Howe Island is situated in S. Lat. 31° 33′, and E. Long. 159° 5′[†], but its relative distances from Sydney, and the nearest point of New South Wales contiguous to it, are variously given. In an Official Report,[‡] however, made by the late Water Police Magistrate, Mr. P. L. Cloete, it is said to be 450 miles north-east of Sydney, and 300 miles from Port Macquarie.

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[*] Australian Museum (Report of the Trustees for 1887–1888), p. 30.

[†] Lord Howe Island (Report on Present State and Future Prospects of) by the Hon. J. Bowie Wilson, *N. S. Wales Legislative Assembly Papers*, 1882, 36–A., p, 8. [W. J. Conder, Report of Superintendent of Trigonometrical Survey.]

[‡] Lord Howe Island—Official visit of the Water Police Magistrate, and the Director of the Botanic Gardens, Sydney; together with a description of the Island. By Edward S. Hill, 1870 (8vo. Sydney), p. 14.

It is some 500 miles this side of Norfolk Island, and is the most southern of the outlying islands on the east coast of Australia (Frontispiece). It is between six and seven miles in length as the crow flies, but much more taking into consideration the great inequalities of the ground; whilst the average width is only one mile, but more in certain parts. According to Mr. Charles Moore, the Government Botanist, the island contains 3,220 acres, of which 2,000 are capable of cultivation.*

The small group of islets generally comprised under the name of Lord Howe Island consists, in addition to the island proper, of a small islet immediately detached from its southern extremity called Gower Island; a similar one to the north, known as the Sugar-loaf; to the east, separated by somewhat more than half-a-mile of water, another which has received the name of Mutton-bird Island; whilst on the west side, within the Lagoon is Goat or Rabbit Island. To the north, separated from the main island, about a quarter of a mile, is a cluster of six rocks known as the Admirality Islets; and still further north two other rocks, one of them called North Island.

Mr. A. T. Corrie, R.N., in a short paper entitled. "A visit to Lord Howe Island,"† has well remarked that the early history is wrapt in a good deal of mystery. "It was," says Mr. E. S. Hill, "during the passage from Port Jackson to Norfolk Island, that Lord Howe Island was discovered by Lieutenant Henry Lidgbird Ball, Commander of His Majesty's tender 'Supply,' on the 17th February, 1788" ‡ (Pl. VIII). A survey of the Island was made in 1835 by Mr. Surveyor H. F. White, but his report does not seem to have been published. A reduction of his map is given by Hill, from which it appears that many of the original names, presumably bestowed by him on the more prominent features have been since altered (Pl. IX). Another report I have not succeeded in gaining access to—by Dr. Foulis, who resided on Lord Howe for three years, about forty years ago—would probably yield much valuable information of the then condition of the island.

We are in possession of but very few details of the zoology of Lord Howe Island, notwithstanding that several collectors of marked ability, for instance, Macgillivray, Brazier, and Masters have visited it and made collections. Although numerous species have been identified, and some described, the descriptions are so scattered and little known, as to be of small practical value to the working naturalist. The birds have been catalogued, so far as known to him, by Dr. E. P. Ramsay § whilst an epitome of a few days collecting has been furnished by Mr. Alexander Morton,|| who accompanied the late Dr. Wilson's expedition in 1882.

The scrubby and thickly timbered condition of Lord Howe rendered collecting both tedious and difficult. Its limited size, and the fact that all branches can be more or less pursued at one and the same time to some extent compensated for this. For all practical purposes however, our investigation resolved itself under three heads—that of the high scrubby hills and intervening gullies; the lower lying, and sometimes more open and less hilly ground; and the marine fauna, more especially the relation of the Lagoon and Coral-reef life as compared with that found on other portions of the shores.

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* Sketch of the vegetation of Lord Howe Island—Hill's *Lord Howe Island, loc. cit.*, p. 17.

† Proc., R. Geogr. Soc. 1878, XXII, p. 136.

‡ Hill's *Lord Howe Island, loc. cit.*, p. 8.

§ Notes on the Zoology of Lord Howe Island. *Proc. Linn. Soc. N.S. Wales*, VII, pt. 1. p. 86.

|| Report to the Trustees of the Australian Museum. *Lord Howe Island, Report on Present State, &c.*, 1882, *loc. cit.*, p. 12.

The dense and beautiful vegetation has been ably described by Mr. Charles Moore,* and Mr. John Duff,† of the late Forest Branch, Department of Mines.

The latter says:—"There are probably few islands of similar size possessing so rich and varied a flora as Howe Island, handsome banyan and other trees, shrubs, palms, pandanus, and dwarf ferns growing everywhere in great abundance and luxuriance."

Touching the magnificent Banyan trees to be seen on Lord Howe, Mr. Charles Moore remarks:—"The most remarkable plant, however, upon the Island is a species of *Ficus*, and the only one of the genus found there. Along the whole extent of the flat and richest ground, on the south-west side, this noble tree grows in large numbers—very rarely in exposed situations—but marks distinctly an inner zone of vegetation, being protected on every side by belts of trees of various descriptions. It possesses to an extraordinary degree the branch-rooting characteristics of the famous Banyan of India, *Ficus indica*. From its high wide-spreading branches adventitious roots are produced, which descend to the ground, then rapidly enlarge and become in the course of time huge stems drawing nourishment from the earth for the support and increase of the parent branch, which, as it extends, produces similar root-stems, the tree by this means covering a very large space of ground. In some instances the original stem had perished altogether, the branches becoming separate trees, each with numerous root-stems, and forming by the whole a beautiful amphitheatre of considerable dimensions."

Again, Mr. Duff's observations are interesting:—"These old trees are certainly the most remarkable and interesting features in the vegetation of Howe Island, their large columnar roots descending from the horizontal branches, often from a height of 50 to 60 feet, and at distances of 4 to 6 feet apart, forming a series of supports to them, each root having the appearance of being a separate tree. Some of the largest of these old trees are reputed to cover an area of 2 to 3 acres."

Mr. Moore further states that "every part of the island is covered with a dense vegetation, the undergrowth being kept comparatively clear by pigs and goats, which are allowed to roam at large." At the present time the aspect of the island is very different; the domesticated goats have been abolished by mutual consent on the part of the Islanders, and the pigs penned up, whilst the wild goats and pigs are confined to the two extremities of the Island. Now the scrub and brush is of the most copious description, and renders travelling, except along the beaten tracks, both tedious and difficult.

It may, perhaps, not be out of place to refer here to the palms growing on the island. Both Mr. Moore and Mr. Duff have recorded four species.‡ Up to an altitude of 400 feet the Thatch Palm (*Kentia Forsteriana*,) grows, but it flourishes luxuriantly along the shore flats, in the form of groves. The Curly Palm (*K. Belmoreana*), on the other hand, extends as high as 1,200 feet on the sides of Mounts Ledgbird and Gower. The third species, the Umbrella Palm (*K. Canterburiana*), is first met with at about 1,000 feet § and continues to the summit of the highest of the two mountains, Mount Gower, at an elevation of 2,840 feet. The last and smallest of these handsome trees, the Dwarf Mountain Palm (*K. Moorei,*) is confined to the summits of Mounts Gower and Ledgbird. A very remarkable fact in connection with the two lowland species, *K. Forsteriana*, and *K. Belmoreana*, and one I have not hitherto seen mentioned, is worthy of record, and has a bearing on the geology of the island. Wherever the soil is derived from the decomposition of the Coral-sand rock, the Thatch Palm (*K. Forsteriana*) exclusively prevails, whilst the appearance of the Curly Palm at once indicates a volcanic soil. So marked and constant is the position of the two palms, that it may be taken in a general way as an index to the running of geological boundaries between the two formations.

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* Sketch of the vegetation of Lord Howe Island. Hill's *Lord Howe Island, loc. cit.*, p. 17.

† Report to the Hon. J. Bowie Wilson, *Lord Howe Island, Report on Present State, &c.* 1882, *loc. cit.*, p. 8.

‡ Sketch of the Vegetation of Lord Howe Island, *loc. cit.*, p. 19.

§ These are the heights given by Mr. Duff.

Mr. Moore says that the Thatch and Curly Palms "both grow to about the same height, the highest observed being about 35 feet." In favourable situations, however, these trees attain to a much greater stature than thirty-five feet. I was conducted by Capt. T. Nichols, a resident, to the "Valley of the shadow of Death," a gully on the eastern side of the Island, running down to Middle Beach, where the finest palms are to be seen. Here the Thatch Palm grows with clean, straight stems to heights of 60, 70, and in a few instances to as much as 100 feet, the over-lapping leaves forming a complete canopy above, producing a general gloom, well expressed by the name conferred on the ravine.

The Physical Features of Lord Howe will be described in a subsequent report, when dealing with the Geology.

The remarks which follow are intended to give a general outline of the collections made by us, and an epitome of the zoology of Lord Howe Island, so far as known.

Mammalia.—The first settlers date no farther back than about 1834, when three New Zealand colonists are said to have taken up their residence there with Maori women. Since then there has been a very sparse and fluctuating population, but traces of aboriginal inhabitants have nowhere been discovered. I made every effort to ascertain whether any remains had been met with in caves; or traces of early man in the form of implements, or rock paintings, but without the slightest success.

The only indigenous lower mammals existing on Lord Howe are bats, but even these are not plentiful. A single specimen of *Scotophilus morio*, Gray,* similar to those obtained by Morton was shot by Mr. Unwin, and a larger species was occasionally seen. The "gardens" and other clearings are their favourite haunts, but they are sometimes seen flying around the cottages. Mr. A. Morton, when on the island in 1882, reported the existence of a flying fox,† but careful inquiry failed to elicit confirmatory evidence of this, and none were observed by us. We anticipated meeting with bats in the Coral-rock caves at North Bay, one of the most favourable habitats for them on the whole island, but not the slightest trace was found.

According to Mr. Morton the shores are visited, especially during gales, by seals, probably identical with one or other of the Australian species of *Arctocephalus.*

A mouse, said to have been introduced from Norfolk Island, is now moderately common. It appears to Dr. Ramsay and myself to be a variety of *Mus musculus*, with a larger proportion of yellow-tawny hair, mixed with the fur of the back, than is usually seen in that species. It now frequents the houses, but formerly infested the clearings in such numbers as to become a pest. Writing in 1870, Mr. E. S. Hill says,* "Mice within the past two years have accidentally been introduced. They now swarm the island, and threaten to become a great nuisance ; they have taken to the fields and burrow in every knoll." To show the remarkable manner in which this little rodent has diffused itself over Lord Howe, we were informed by Mr. W. Nichols that it had been found under the precipitous wall towards the summit of Mount Ledgbird. Rabbits formerly existed on Rabbit or Goat Island, the small islet in the Lagoon, but they appear to have died out. From a remark made by the writer just quoted—"there are a few rabbits, which fortunately are confined to a small island on the west side, between the shore and the reef"—they do not appear to have gained a footing on the main island.

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* Dobson (Cat. Chiroptera, Brit. Mus. 1888, p. 248) calls this *Chalinolobus tuburculatus* Forster, sp.

† Report to the Trustees, &c., *loc. cit.*, p. 12.

It is a remarkable fact, when we take into consideration the extent of cover and the general physical features, that the indigenous mammalian fauna is practically none. It is one of the strongest arguments in support of the relation of the fauna at large to that of New Zealand, as against its Australian affinities, where the only undoubted indigenous mammals are bats! This comparative absence of the highest forms of animal life is again instanced in the case of the Sandwich Islands. Since the advent of the first settlers, pigs, goats, and the domestic cat have been introduced and lapsed into a natural state. Mr. Campbell Stevens, the Postmaster at Lord Howe, and a very intelligent natural history observer, says that the original cat, which took to the bush, was black, but cats of that colour have entirely disappeared, whilst those met with wild in the hills at present are the descendants of the variety now domesticated there, and in which the black colour does not predominate. Mr. Hill says: "In the olden time, twenty-four years back, a number of cats were sent ashore from a whale ship and turned adrift. These soon became populous, and found an easy prey in the pigeons, parrots, birds like a guinea-fowl, and brown hens, decimating the former and driving the latter to the mountains. These cats are still numerous, and all black."† Goats and swine formerly roamed over the whole island, but both are now largely decreased in number, not so much from hunting, we were told, as from a cause, the explanation of which is not at first apparent. It seems, however, that the breed of neither has been to any extent altered by the introduction of fresh blood, and it is more than probable that deterioration has arisen from the consequent inter-breeding of individuals confined within a limited area. The goats are restricted to the mountainous ground of Mounts Gower and Ledgbird in the south, and the North Ridge at the opposite end of the island, the respective herds remaining separate from one another. Their activity is very remarkable, as shown by the manner in which they ascend and descend the almost perpendicular faces of the cliffs. We observed the ease with which this is accomplished on the sea-face of the North Ridge, when on our cruise to the Admiralty Inlets, where a small party, feeding on some grassy ledges close to the water's edge, on the approach of the boat, zig-zaged their upward course from ledge to ledge, and point to point, until the brow of the cliff was reached, and they disappeared over to the less precipitous land side. The swine are now confined to the southern end of the island, especially on the slopes of Mount Ledgbird. Now and then fine animals are produced, boars, we were told by Mr. G. Nichols, at times reaching 200 ℔., but the average all round weight is 100℔. During an excursion to the high ground about Erskine Valley, and on another occasion, when on our way to

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* Hill's *Lord Howe Island, loc. cit.*, p. 46.
† Hill's *Lord Howe Island, loc. cit.*, p. 46.

Mutton-bird Point, we observed traces of pigs, both tracks and wallowing places ("mud holes"). An excellent description of the method employed by the Islanders in hunting goats is given by the late Deputy Surveyor-General, Mr. R. D. Fitzgerald,* and is well worth perusal.

Aves.—The birds of Lord Island have received greater attention than any portion of its fauna, but the general information relating to them, and the specific descriptions are very much scattered. In an interesting paper "Notes on the Zoology of Lord Howe Island,"† Dr. E. P. Ramsay gives a list of thirty-four birds known to him as occurring there, but omitting one, an undoubted introduction, there remained at the time his table was published thirty-three indigenous birds. Since then the "Tabular List of all the Australian Birds"‡ has appeared by the same author, in which a comparative table of the Lord Howe and Norfolk Island birds is given. Certain changes in nomenclature are made, which will be referred to hereafter (see p. 16). The collection acquired during our stay at Lord Howe Island, through our own efforts and those of Mr. G. Nichols, comprising about two hundred skins, has been examined and named by Dr. Ramsay, and although we were not fortunate enough to obtain an equal number, several birds were met with, or seen, not mentioned in the list referred to. I have adopted Dr. Ramsay's list and table, distinguishing the species shot by ourselves with an asterisk (*), whilst those which are additions to the record are indicated by a dagger (†), (see p. 17).

Of the rapacious birds, the diurnal division is represented in Dr. Ramsay's list by two Fish Eagles, *Haliaster sphenurus*, Vieill, and *Haliætus lucogaster*, Lath. We did not meet with either of these birds, but the existence of a Hawk, *Circus Wolfii*, was determined. It frequents the North Ridge, usually in the vicinity of Mount Eliza, soaring high, and carefully keeping out of reach. The bird, however, has at times, after the manner of its kind, been known to visit the settlers' poultry-yards, and is said to play great havoc with the wild kids.

The nocturnal section of this group has for its representative *Ninox boobook*, Lath., but is known to the Islanders as the "More-pork." *N. boobook* frequents thickets of scrub on the hill sides, during the day, and may be found around the settlements at night, probably on the look out for mice, otherwise its food is a mystery, unless it be nocturnal insects.

The Kingfishers are very abundantly represented by one species, *Halcyon vagans*, Less., a New Zealand bird,§ and we were told a comparatively recent addition to the avifauna of the island. It may be constantly seen, flying about the small open places and clearings along the shore, or perched on dead timber, or even seated on small rocks at and below tide-marks.

It pairs in October, or perhaps towards the end of September. Sir W. L. Buller's remarks on the habits of this bird can be very appropriately applied to the variety found at Lord Howe:—"It is, moreover, one of those birds that seem instinctively to resort to the habitations of man; and instead of, like many other indigenous species, decreasing, it thrives and multiplies under the altered physical conditions resulting from the colonization of the country. . . . . During the winter months, especially, it resorts to cultivated grounds in quest of grubs and worms, which at this season constitute its principal food. . . . In the pairing-season this species becomes very noisy and lively, the mated birds chasing each other in amorous play from tree to tree, or from post to post, with loud unmusical cries, something like the syllables *cree—cree—cree* uttered in quick succession."

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* Hill's *Lord Howe Island, loc. cit.*, p. 44.

† Proc. Linn. Soc., N. S. Wales, 1883. VII, pt. 1, p. 86.

‡ Tabular List of all the Australian Birds at present known to the Author, &c., 4to. Sydney, 1888.

§ See Buller, Manual of the Birds of New Zealand, 1882, p. 8, t. 3.

The Bush Creepers have two representatives at Lord Howe, *Zosterops strenuus*, Gould, and *Z. tephropleurus*, known as the "Silver-eyes." Both species are indigenous to the island, and are met with in small flocks, equally plentiful both in the open spaces and thick scrub. The chief difference between the species is that of size, and slight shades of colour only, but individuals were carefully sexed by Mr. Thorpe.

The most interesting point connected with our researches amongst the birds was the discovery of a new *Gerygone*. Dr. Ramsay had already described one species from Lord Howe, *Gerygone insularis*,* but the new one is much smaller than the latter, with a feebly-yellow tinted breast. Two examples were shot by Mr. Thorpe and myself on August 24th, and were carefully sexed by the former when skinning them. It has been named by Dr. Ramsay *Gerygone Thorpei*,† a very deserving tribute to Mr. Thorpe for his exertions towards the success of our expedition. It associates itself with the larger species, *G. insularis*, and appears to be particularly fond of frequenting lemon-trees. The latter species is locally known as "Pop-goes-the-Weasel," and possesses a very pleasing song-like note.

Merula vinitincta, Gould, a very active and pleasing bird, represents the Thrushes. It is locally known as the "Doctor Bird," and is peculiar to the island. Other and allied species are found throughout the Pacific Islands, such as New Caledonia, Fiji, the Sandwich and Solomon Islands, and the New Hebrides; but the genus is unknown on the Australian continent. In the paper previously quoted, Dr. E. P. Ramsay says:—"It is somewhat remarkable that while the genus *Merula* is found so close to Australia as on Lord Howe Island, no species of the genus has been recorded from the mainland."‡ *M. vinitincta* frequents the more secluded hillsides, especially at the north end of the island, although it was found in the low ground bordering the shore, on the east side, but not to the same extent. We also observed it high upon the flanks of Mount Ledgbird. Mr. R. D. Fitzgerald§ states also that the bird possesses the same leaf-tossing habits as the Blackbird. The nest is composed of palm-tree fibre, and is long and cylindrical, the base solid and filled up.

A more numerous group are the Flycatchers. We obtained the really elegant *Rhipidura cervina*, Ramsay, another species peculiar to Lord Howe. It is a delicate bird, frequenting any open glades where insects can be taken on the wing. Dr. Ramsay also records the occurrence of *Myiagra plumbea*, V. & H., and *Eurystomus pacificus*, the "Dollar-bird" of New South Wales. Passing to the Pachycephalinæ or "Thick-heads," the type genus *Pachycephala* is represented by two species, *P. gutturalis*, Latham, and *P. rufiventris*, of the same author. The former we found to be common, and in no way to differ from individuals found in New South Wales. It is the most brilliantly coloured bird met with on Lord Howe Island, and the vivid yellow breast plumage of the male is readily distinguished in the low-lying scrubs and thickets. *P. gutturalis* was not seen on any of the higher points of the island. *P. rufiventris* recorded by Dr. Ramsay, did not come under our notice.

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* Proc. Linn. Soc. N.S. Wales, 1878, III, pt. 2, p. 117.

† *Ibid*, 1887, II, pt. 4, p. 677.

‡ Proc. Linn. Soc. N.S. Wales, 1878, III, pt. 1, p. 89.

§ Hill's *Lord Howe Island*, *loc cit.*, p. 38.

Aplonis fuscus, representing the Starlings, is both one of the most plentiful, and at the same time destructive birds, playing great havoc in the settlers' gardens during the fruit season. The genus *Aplonis* is a peculiarly Oceanic one, being met with in the southern part of New Guinea, Fiji, the New Hebrides, and Solomon Islands, but is represented in Australia by the allied genus *Calornis.*[*] Although frequenting the smaller and lower trees, it undoubtedly loves high branches and elevated positions. *A. fuscus* is easily tamed, and forms a lively pleasurable companion.

The musical honours amongst the birds of Lord Howe are carried off by the so-called Magpie, *Strepera crissalis*, Sharpe, whose note, although not by any means as melodious as some of the magpies of the mainland, is not unpleasant. The bird is another of those peculiar to Lord Howe, and is very plentiful, especially at this season of the year, in the higher regions and retired deeper gullies of the south end. Young birds make fair eating.

Philipp Island, an outlier of Norfolk Island, was inhabited by a parrot, *Nestor productus*, Gould, so Lord Howe Island was similarly infested in former years by a parrakeet, of which there is not the slightest trace remaining. The existence of the bird in question is mentioned by Mr. A. T. Corrie, in the paper previously quoted, but we are indebted for a general description of it to Mrs. Thomas Nichols and Mr. Mosely. They described the parrakeet as generally of a green colour with a red patch on the head, at the base of the bill; red under, and a little blue along the edge of the wing. These characters accord fairly well with those of some Platycerci, especially species inhabiting New Zealand; in fact, there is good reason to conjecture that it may have been either *Platycereus novæ-zelandiæ*, or *P. auriceps*, but as no mention was made of any yellow feathers the bird was most probably the former species, more especially as this is recorded as occurring at Norfolk Island.[†] The parrakeet is said to have existed in very large numbers, doing considerable damage to the crops, and to have gradually disappeared about ten years ago. This would correspond with the date of Mr. Corrie's observations. Even before this, in 1870, it must have been very scarce, for we find Mr. E. S. Hill observing, "The paraquet also was a nuisance to the cultivators, once appearing in flocks; now I saw but a solitary pair in their rapid flight through the foliage, and recognized them only by their peculiar noise."[‡]

Of the Cuckoos, two species have been met with, but they are rare. We obtained *Cuculus inornatus;* and *Chalcites lucidus*, Gml., the Bronze Cuckoo, is quoted by Dr. Ramsay. The latter bird has been caught at sea, between Lord Howe Island and New Zealand, doubtless whilst migrating from the latter to the former island.

The Columbidæ are now represented on Lord Howe Island by one species only—the *Chalcophaps chrysoclora*, Wagl., a representative of the *Gouridæ*, or ground pigeons. This is an elegant and gentle bird, is found in all thick low timber on the flats and bases of the hill flanks, and is easily traced by its low plaintive note. It is so tame that the settlers are in the habit of catching it with the hand snare. In former years other varieties of pigeons must have existed in numbers for Mr. Fitzgerald remarks that, "a large pigeon is remembered, but has become extinct."[§] The common "Rock" has been introduced and established itself; it is, however, as wild in its habits and difficult of approach as the *Chalcophaps* is gentle and tame.

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[*] Ramsay, Proc. Linn. Soc., N. S. Wales, 1883, VII, pt. 1., p. 89.

[†] Buller, Manual of the Birds of New Zealand, 1882, p. 34.

[‡] Hill's *Lord Howe Island, loc. cit.*, p. 46.

[§] Hill's *Lord Howe Island, loc. cit.*, p. 38.

Writing on this subject, Mr. E. S. Hill remarks, "There appears to be a predisposition in animals to go wild on this island;—domestic pigeons have forsaken the dove-cot, and have taken up positions in the mountain cliffs, and have proved the correctness of Darwin's theory, for what were originally pied and mottled are now blue, with bar shoulder, with rare exceptions. The island at one time abounded with large wild pigeons—so much so, that within the past twenty-five years it was no unusual thing for a man to snare, by aid of a stick and string, fifteen or twenty birds of a flock without the others taking the least alarm."*

It appears strange, considering the excellent cover some of the flats afford, that no rasorial birds, such as the quail, exist. It is, however, due, perhaps, to the distance of Lord Howe from the mainland being too great for the performance of their periodical migrations. The fowl is another instance of a domestic creature which has become wild. Some years ago a number took to the bush and have bred and thriven there. The present breed of domestic fowl kept on the island is the Bramah and its crosses. The birds in question, however, are quite distinct from this, and there does not appear to be any attempt at inter-breeding. They have not spread, as they seem to frequent the hill-sides near the holding from which they originally escaped.

The Plovers are represented by the Golden Plover, *Charadrius xanthocheilus*, Gould, a handsome bird, associated in small flocks, and also accompanying one of the curlews, *Numenius uropygialis*. We met with these birds along the shores of the Lagoon and other reaches on the east side, especially where the beach assumed a less sandy character than usual.

Several birds recorded by Dr. Ramsay, but not met with by us, take their place here, such as the Bittern, *Ardetta minuta*, Linn., and the Nankeen Crane, *Nycticorax caledonicus*, Lath. The White-fronted Heron, *Ardea novæ-hollandiæ*, was seen by Mr. Thorpe on the rocks to the north of Middle Beach. Two genera of Curlew are plentiful—*Limosa uropygialis*, Gould, and *Numenius uropygialis*—and are to be seen in any of the little bays where a sandy shore predominates. The Hooded Dottrell, *Hiaticula monacha*, was also seen by Mr. Thorpe.

Sand-pipers did not come under our observation, but Ramsay records *Cinclus interpres*, Linn., and a species of *Œgialitis*.

Rails are not indigenous to the island, but *Rallus pectoralis*, Gould (called *Hypotænidia australis*, Pelzeln, in Dr. Ramsay's last list), is said to have been introduced, but we were not fortunate enough even to see it. The Red Bill, *Porphyrio melanotus*, as far as we could ascertain, is an indigenous bird, at least it is believed to be so by those Islanders to whom we mentioned the matter. To our great annoyance we did not see a trace of it, its occurrence being a fact we much wished to put beyond doubt, in connection with its relation to the extinct *Notornis alba*, White, sp. The very remarkable bird, known under this name, and probably quite extinct, is without exception, the most noteworthy of the forms comprising the fauna of Lord Howe Island. Although specimens are not preserved, so far as I know, in any of the Australian Museums, there is now no doubt that the *Fulica alba*, White, as it was formerly called, existed in large numbers both on Lord Howe and Norfolk Islands. As *Fulica alba* it was described by White† without locality, and ostensibly from New South Wales, but it is more than probable that his specimen found its way from Norfolk Island in the earliest days of convict settlement there. Mr. E. S. Hill, in the pamphlet previously quoted, remarks that in one of Lieut. P. G. King's (the first Governor of Norfolk Island) reports from thence, mention is made of a bird "not unlike the Guinea-fowl, except in colour (being chiefly white)."[*] Governor Phillip, likewise, in his "Voyage to Botany Bay,"[†] gives as the localities of this bird, Norfolk and Lord Howe Islands. Either under the above name, or as *Galinula alba*, Latham, or *Porphyrio alba*, Gray, the White Gallinule was known, until Dr. von Pelzeln, in a paper on the "Birds of Norfolk Island,"[‡] and again in another on the "Birds in the Imperial Collection at Vienna,"[§] pointed out its affinity with the quasi-extinct New Zealand genus *Notornis*, Owen, and of which it forms only the second species known. Pelzeln believes the skin in the Imperial Collection at Vienna to be White's original specimen, as it was purchased at the sale of the Laverian Museum. Mr. G. R. Gray, in a "List of the Birds of New Zealand and adjacent Islands,"[||] mentions *Porphyrio alba* as coming from Norfolk Island and described it as "entirely white, but some differ in having bright blue between the shoulders, and spotted on the back with the same." He further adds:—"It is stated that a similar bird was found on Lord Howe Island, which was incapable of flight. The wings of the male were beautifully mottled with blue." And again he further states:—"The young are said to be black, then they become bluish-grey, and afterwards pure white." In 1869 the venerable Dr. G. Bennett[¶] spoke of the White Gallinule as formerly found on both islands, although at that time extinct.

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* Hill's *Lord Howe Island, loc. cit.*, p. 46.

† Journal of a Voyage to New South Wales, 1790, p. 238.

An excellent opportunity was afforded Mr. E. S. Hill, in 1870, of ascertaining the state of matters at Lord Howe respecting this bird, when he accompanied Mr. Cloete's Expedition. In his pamphlet the following remarks are made:—"There were also white birds like a Guinea-fowl. All that we could now learn of any bird of this kind was that once or twice large birds at certain seasons, and within the past two years, have been seen, the colour of which was bluish wings, with slate-coloured body, but having a remarkable double red comb. This, with the exception of a double red comb, answered pretty well to the description of *porphyria* or red-bill of Australia; and probably the male birds only exist now, as evidently all the larger birds seen both here and at Norfolk Island in 1788 were white birds, probably females."[**] Messrs. Salvin and Sclater[††], when noticing this statement, say, "This bird is very probably the same as the species from Norfolk Island, described by Latham as *Gallinula alba*." With the exception of the skin in the Imperial collection at Vienna, there appears to be only one other in existence, which is said by Professor A. Newton[‡‡] to be in the Derby Museum at Liverpool. An excellent figure of this bird has been given by Mr. O. Salvin,[||||] taken from a sketch by Von Pelzeln of the type skin. The feathers of the neck and breast possessed a yellowish tinge, those of the remainder of the body with a delicate indication of blue, the legs yellow, the bill, forehead, and iris of the eye red. I have referred at this length to *Notornis alba* with the view of attracting notice to a probably extinct and little known bird, a recently surviving species of a genus akin to the *Dinornis*, and one of which there does not appear to exist a skin in any of the Australian Museums. The occurrence of the White Gallinule on both islands within the historical period is a very interesting point, and one of the most prominent features in the evident relation which exist between their fauna and that of New Zealand. It is possible of course, although not probable, that a few individuals may still remain in the hilly and less frequented portions of Norfolk Island, but with regard to Lord Howe I fear no trace is likely to be found. Writing of the New Zealand bird, *Notornis Mantelli*, Owen, the type of this genus, Buller says, "Thus, the three known examples have been taken from localities ninety miles apart, and over an interval of thirty-five years, proving pretty conclusively that the species still survives in the remote parts of the country."* This may also apply to Norfolk Island. It is very interesting to find that one of the most philosophic minds who have ever written on the subject of life distribution, Alfred Russell Wallace, should have conceived the probable existence of a cursorial bird on Norfolk Island, apparently without any knowledge of *Notornis alba*. Speaking of the Chatham Islands, he says, "It is to be hoped that some search will be made here, and also in Norfolk Island, in both of which it is not improbable remains, either of *Apteryx*, or *Dinornis* might be discovered."†

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[*] Hill's *Lord Howe Island, loc. cit.*, p. 8.
[†] London, 2nd edit., 1790, p. 160.
[‡] Reviewed in the *Ibis*, 1860, p. 421.
[§] *Ibis*, 1873, p. 14.
[||] *Ibis*, 1862, p. 214.
[¶] Proc. Zool. Soc., 1869, p. 471.
[**] Hill's *Lord Howe Island, loc. cit.*, p. 46.
[††] Index of the Ornithological Literature of 1870, *Ibis*, 1871, pp. 417 and 443.
[‡‡] *Ibis*, 1866, p. 159, note.
[||||] *Ibis*, 1873, p. 295, t. 10.

Soon to become extinct on Lord Howe, unless protected, is the Wood-Hen, *Ocydromus sylvestris*, Sclater, a curious and stupid bird. At the present time its range is confined to the extreme southern end of the island, in Erskine Valley, and the ground around the sea-girt base of Mount Gower. It is even now rare and difficult to obtain, and would be impossible of capture were it not for the fact that its curiosity overcomes its shyness. Its gradual extinction is probably due to the ravages committed by the wild domestic cats. During a journey to Mount Gower, primarily to procure specimens, only one individual was seen, and during the whole of our residence there those well acquainted with their haunts could obtain but four others. *Ocydromus sylvestris* can be attracted within gun shot by any continuous and varied noise, such as knocking two stones together, striking against a tree, occasional whistling, and other peculiar but discordant noises. Mr. R. D. Fitzgerald, Deputy Surveyor-General, during a trip to Mount Gower at the time of Cloete's Expedition had an excellent opportunity of witnessing the method adopted by the Islanders for catching this bird. His account is as follows‡ :—"Ned suddenly stopped with the exclamation, 'That's a wood-hen!' as a note like two rasps at a saw is heard at some distance among the lower stones and fern. Then he imitates the bird, and the wood-hen answers. He tries the imitation again, but the bird is silent. Tom strikes the back of the tomahawk against a tree, again the bird answers. Then the strokes of the tomahawk are of no use, and the barking of a dog is tried with effect, at each time the answer being a little nearer, and so on. Anything that strikes him as strange, say a scrap of the National Anthem by all hands, or the crowing of a cock, or anything else with which the bird is not likely to be acquainted. Nearer and nearer comes the answer, till suddenly out runs a bird, like a large corn-crake, in a daft sort of way, up to their very feet."

Ducks are occasionally known to visit the island, but we were unable to ascertain the species. Dr. Ramsay quotes *Anas superciliosa*, Gould.

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* Manual of the Birds of New Zealand, 1882, p. 65.

† Island Life, 1880, p. 450.

‡ Hill's *Lord Howe Island*, 1870, p. 42.

Lord Howe and its associated islets are a great resort of sea-birds, and have been so more in the past than now. This is particularly the case with the Admiralty and Mutton-bird Islets, and a few spots on the main island, which are at certain seasons of the year veritable rookeries.

The larger of the Admiralty Islets is an irregularly shaped island, pierced at its northern end by a sea-water passage. The north-east side presents a perpendicular face to the ocean, but its western face is a gradual although steep slope, and is occupied by thousands of birds, Gannets, Petrels, and Terns. There is but one point at which a landing can be effected, and this only in fine settled weather. The whole hillside is indiscriminately occupied by the sea-fowl, every tussock hides a so-called nest, and every projecting piece of rock has its sitter. Notwithstanding their number, there is no regular deposit of guano, but what there is becomes mixed with the red loamy basaltic soil, and is more or less washed over the faces of the cliffs on the eastern side and northern end, and from the succeeding chemical decomposition produces a white streaky appearance on the cliff faces, over which the semi-fluid material has poured, and giving rise, when viewed at some distance from a boat, to the appearance of a series of white-washed spaces on the perpendicular cliffs. The late Dr. Charles Darwin, F.R.S.,* describes a similar substance on the cliffs of St. Paul's rocks—"Extensive portions of these rocks are coated by a layer of a glossy polished substance with a pearly lustre and of a greyish-white colour; it follows all the inequalities of the surface, to which it is firmly attached......It is considerably harder than calcareous spar, but can be scratched with a knife; under the blow-pipe it scales off, decrepitates, slightly blackens, emits a fœtid odour, and becomes strongly alkaline; it does not effervesce in acids. I presume this substance has been deposited by water draining from the bird's dung, with which the rocks are covered."

Amongst the Petrels, *Prion turtur* was obtained, but at the time we visited the island, it was anything but common. It is perhaps worthy of record that we saw the Pintado or Cape Pigeon, *Daption capensis*, both going and returning from the island about S. Lat. 32°. This group is, however, abundantly represented by the "Mutton-birds," so called. Two species, *Puffinus brevicaudus*, Brandt, and *P. sphenurus*, Gould, are exceedingly common; the smaller *P. sphenurus*, on Mutton-bird and Goat Islands, and on the Admiralty Islets, but the other species frequents certain spots on the east coast of the island itself. The Mutton-birds begin to arrive at the latter end of August, as we made our first capture on September 1st, on Goat Island. The same species was afterwards obtained by Mr. Thorpe and the writer at Mutton-bird Point, where we experienced both the biting propensities, and the peculiar and offensive smell emitted by these birds. Their holes are usually hid under a tussock of grass, sometimes running into the face of the slope for a considerable distance, at other times a mere excavated depression of the surface. The propensities just mentioned have been commented on by the late Mr. Macgillivray, who, speaking of Goose Island, in Bass Straits remarks†—"As usual with the Petrel family, they bite severely if incautiously handled, and disgorge a quantity of offensive oily matter, the smell of which pervades the whole island." The large species, *P. brevicaudus*, frequents the east coast of the main island, and forms for itself extensive rookeries extending inland from the edge of the cliff, or the beach at high-water mark, as the case may be, for a considerable distance. Good examples of these "rookeries" may be seen at Clear Place Point, the head of the Valley of the Shadow of Death, and at Ned's Beach. Regular runs, or pathways, are formed through the long grass or scrub, by the constant locomotion of the birds to and from the sea. At these places the burrows consist of vertical or somewhat oblique funnel-shaped holes or depressions scooped out in the loose sandy or rich loamy soil, as the case may be. At the Clear Place Point and the Valley of the Shadow these excavations occupy acres in extent, some of the burrows, instead of mere depressions, consisting of underground tunnels, extending inwards horizontally for as much as three feet. The birds begin to arrive in September, and become plentiful in October, when they proceed to clear out the old holes; and we were informed by Captain T. Nichols that the din at night, when this is going on, and fighting that takes place for the possession of favoured spots by rival claimants, is something deafening. According to the same informant, laying is commenced about 28th November regularly, and completed on 1st December, the young after hatching being fed and tended until April, when they are allowed to cater for themselves. Some idea of the immense numbers of these birds may be gained from a statement made by an anonymous writer "Linnæus."* He says:—"Some idea may be formed of the flocks of the dusky mutton-bird, when it is mentioned that a party of five visited one island three days during this last season (1882) and obtained in a few hours 600 dozen of the eggs." He further adds:—"The eggs are perfectly sweet, and not the slightest unpleasant flavour or odour can be detected. They answer just as well as duck's or hen's for all purposes to which those are employed, the only difference being that the albuminous portion is slightly in excess in the eggs of the mutton-bird." A third species of mutton-bird, with which we are at present unacquainted, is found on the summit of Mount Ledgbird, at a height of 2,504 feet. We heard this bird passing overhead, when camped in Erskine Valley, and the fledglings were obtained for us by Messrs. C. & G. Nichols. The bird is said to have a quantity of white feathers in its plumage; this, and also its time of breeding clearly indicate as specifically distinct from the other two referred to above. It is believed by Dr. Ramsay to be a *Procellaria*.

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* Geol. Obs. Volc. Islands, visited during the voyage of H.M.S. "Beagle," 1844, p. 32.

† Voyage of H.M.S. "Rattlesnake," 1852, I, p. 73.

The Terns are exceedingly well represented. On the precipitous cliffs of the east coast, and on the Admiralty Islets we met with *Anous cinereus*, Gould, the Grey Tern, and obtained its egg. It is a very elegant little bird making its apology for a nest, consisting of a few straws, on ledges, usually overhung by a projecting point of rock. Dr. Ramsay has lately described† the egg from specimens we obtained.

In strong contrast to the above is another species, *Anous stolidus*, Latham, the Noddy Tern, locally known as the "Noddy." With its sooty-brown plumage, black breast, and french-grey poll, this bird forms a strong contrast to *A. cinereus*. We observed it only on the Admiralty Islets, where they form a flat nest on the few low bushes to be found there. The nest seems to be made of any flotsam and jetsam the bird can pick up, cemented together with a dirty-looking paste, probably earth. The birds had evidently paired at the time of our visit, but had not laid. A third and very graceful species is the Sooty Tern, *Onychoprion fuliginosus*, Gould, known to the Islanders as the "Wideawake." Its white breast, white forehead and cheeks, and otherwise black plumage, with the two long delicate tail feathers, render it quite as conspicuous as the last species. In Gould's figure of *O. fuliginosus* the two characteristic tail feathers are represented black with a white edging, whereas, in reality, they are quite white, with the slightest possible cloud on the inner margin. The egg is laid on any exposed surface, ledge or rock, or on bare spots amongst grass, without protection of any kind, from immediately above high-water mark upwards to the full height of the island. The eggs, which vary much in the mottling of the surface, are plentiful at the beginning of September. They have been since described by Dr. E. P. Ramsay.*

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* The Island of Lord Howe. The Madeira of the Pacific.—By "Linnæus." (12mo. Sydney, 1882), pp. 8 and 9.

† Proc. Linn. Soc., N.S. Wales, 1887, II, pt. 4, p. 678.

The Tropic Birds are represented at Lord Howe by *Phæton phœnicurus*, Gould, known as the Red-tailed Tropic or Boatswain Bird. We observed them on the west side of Mount Ledgbird and on the seaward precipitous face of the North Ridge. It is a remarkably shy and difficult bird to obtain. A frigate-bird, probably *Attagen ariel*, Gould, the small frigate-bird of Torres Straits, is also said to be a visitant.

The Gannets are confined to the Admiralty Islets, although one or two stray individuals of *Sula australis*, Gould, were seen sailing about the Lagoon. The bird inhabiting the Admiralty's is *Sula cyanops*, of which we obtained a fine series. On approaching from seaward, the white plumage of this bird renders it a most conspicuous object, presenting to the eye large white dots scattered in all conceivable positions over the side of the hill. *S. cyanops* is very stupid, sluggish, and easily captured, for when climbing the steep sides of the Islet, they may be literally walked over, before any attempt on their part is made to waddle off. The egg, of which we obtained a few, is white, nothwithstanding Gould's statement to the contrary, that it is stained red. Dr. Ramsay has lately described† examples brought by us.

The eggs are simply laid between tussocks of grass. In Gould's figure, the legs and feet are represented as of a peculiar green, and the iris of the eye yellow. Every example collected by us, on the other hand, had these portions of the body black. Gould's representation is far from a good one. Lastly a Pelican is said to sometimes visit Lord Howe, but there is not enough brackish water for these birds.

The tameness of the land-birds on this ocean-girt island is very remarkable, so much so that at times it is difficult to get sufficiently far enough away from certain species to avoid blowing the specimen to pieces. This trait is taken advantage of by the residents who frequently obtain birds alive by hand snaring. It is particularly noticeable in the case of *Merula vinitincta*, both species of *Gerygone*, *Pachycephala*, and to some extent also *Aplonis fuscus*. A similar friendliness of disposition is described by Darwin in the case of the birds of the Galapagos Islands.‡ "I must describe," he remarks, "more in detail the tameness of the birds . . . . There is not one which will not approach sufficiently near to be killed with a switch, and sometimes as I have myself tried with a cap or hat."

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* *Loc. cit.*, p. 678.

† *Loc cit.*, p. 679.

‡ Journ. Researches Geol. and Nat. Hist., H.M.S. "Beagle," 1839, p. 477.

The explanation of the following table[1] has already been given :—

Name.	Species—peculiar.	New Zealand.		New South Wales.	
		Genus.	Species.	Genus.	Species.
	...	...	...	*	*
Haliastur sphenurus, *Vieillot*	...	...	...	*	*
Haliætus leucogaster, *Latham*	...	*	...	*	*
*Ninox boobook, *Latham*	...	*	*	*	...
*Halcyon vagans, *Lesson*	*	*	...	*	...
*Zosterops strenuus, *Gould*	*	...	...	...	...
*Zosterops tephropleurus, *Gould*	*	*	...	*	...
*†Gerygone Thorpei, *Ramsay*	*	...	...	...	...
*Gerygone insularis, *Ramsay*	*	...	...	...	...
*Merula vinitincta, *Gould*	*	*	...	*	...
*Rhipidura cervina, *Ramsay*	...	...	...	*	*
Myiagra plumbea, *V. & F.*	...	*	*	*	*
Eurystomus pacificus, *Latham*	...	...	...	*	*
*Pachycephala gutturalis, *Latham*	...	...	...	*	*
Pachycephala rufiventris, *Latham*	*	...	...	...	...
*Aplonis fuscus, *Gould*	*	...	...	*	...
*Strepera crissalis, *Sharpe*	...	...	...	*	...
*†Cuculus inornatus *Gould*	...	*	...	*	*
Cuculus flabelliformis, *Latham*	...	*	*	*	*
Chalcites lucidus, *Gml.*	...	...	...	*	*
*Chalcophaps chrysoclora, *Wagler*	...	*	*	*	*
*Charadrius xanthocheilus, *Gould*	...	...	*	*	*
*†Numenius uropygialis, *Gould*	...	*	*	*	*
*Limosa uropygialis, *Gould*	...	*	*	*	*
Ægialitis bicinctus, *J. & S.*	...	*	*	*	*
Cinclus interpres, *Linn*	...	...	*	*	*
Ardetta minuta, *Linn*	...	*	*	*	*
*‡Ardea novæ-hollandiæ, *Latham* (2)	...	*	*	*	*
Nycticorax caledonicus, *Latham*	...	*	*	*	*
Porphyrio melanotus, *Tem.*	...	*	...	...	...
Notornis alba, *White*	*	*	...	...	...
*Ocydromus sylvestris, *Sclater*	...	*	*	*	*
Anas superciliosa, *Gmel.*	...	*	*	*	*
*Prion turtur, *Smith*	...	...	*	*	*
†*Puffinus sphenurus, *Gould*	...	...	*	*	*
‡*Puffinus brevicaudus, *Brandt*	...	...	...	*	*
*Anous cinereus, *Gould*	...	...	...	*	*
*Anous stolidus, *Latham*	...	...	...	*	*
*Onychoprion fuliginosus, *Gmel*	...	...	...	*	*
*Phæton phœnicurus, *Gould* (2)	...	*	...	*	*
*†Sula cyanops, *Sand.* (3)	...	*	...	*	*
†*Procellaria, sp. (4)	...	...	...	*	...
Birds introduced, now wild—					
Rallus pectoralis, *Gould*	...	*	...	*	*
Birds reported to visit or to have existed—					
Pelecanus, sp.	...	...	...	*	...
Platycercus, sp.	...	*	...	*	...

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(1) To this table may now be added *Graculus hypoleucos* and *Himantopus leucocephalus*. (2) Seen, but not captured. (3) *Sula fiber*. (4) The young only obtained.

In the more recently published "Tabular List of Australian Birds," by Dr. E. P. Ramsay, some changes have been made in the nomenclature. Thus: The bird hitherto known as *Ninox boobook* is regarded as distinct from that species, and is described as *N. albaria*, Ramsay; *Myiagra plumbea* becomes *M. rubecula*, Latham; *Cuculus inornatus* becomes *Cacomantis pallidus*, Latham; *C. flabelliformis* is now known as *Cacomantis flabelliformis*, Latham; *Chalcites lucidus*, Gml., is a synonym of *C. plagosus*, Latham; *Puffinus brevicaudus*, Brandt, is now referred to the genus *Nectris; Phæton phœnicurus*, Gould, is now *P. rubricauda*, Bodd.; and lastly, *Rallus pectoralis*, is now entered as *Hypotænidia philippensis*, Linn. The following additional birds are mentioned :—*Circus Gouldii*, Bp.; *Majaqueus Gouldii*, Hutton; *Graculus melanoleucus*, Vieillot; and *Himantopus leucocephalus*.

With regard to the affinities of the bird fauna of Lord Howe, Dr. E. P. Ramsay, in 1883, wrote as follows*:—"It will be seen how closely its avifauna approaches that of New South Wales on the one hand, and in two important particulars that of the New Zealand region on the other. The genera found in the New Zealand region, and not in the Australian, are *Notornis*, *Ocydromus*, *Aplonis*. All the other genera are represented in New South Wales by the same or allied species, there being of the whole avifauna only nine species, as far as it is at present known, peculiar to the island."

Reptilia.—Mr. Corrie, who wrote in 1878,† states that neither snakes nor lizards are known on Lord Howe Island, but in this statement he is to some extent wrong. Snakes are certainly unknown, but this important sub-kingdom is certainly represented by the Lacertilia. We suceeded in obtaining two of the three forms recorded, but no additional ones were captured.

The Geckonidæ are represented by *Phyllodactylus Guentheri*, Boulenger,‡ and *Gehyra oceanica*, Gray.‖ The first was originally brought from Lord Howe Island by the H.M.S. "Herald," and is also known to exist both on Norfolk Island and in North-west Australia. *Gehyra oceanica* was one of the discoveries of that accomplished naturalist and collector J. Macgillivray, during the voyage of H.M.S. "Herald." It is both a Fijian and Samoan species, and in fact appears to be generally distributed throughout the South Pacific Islands.

The Scincidæ have only one representative at Lord Howe, *Lygosoma lichenigerum*, O'Shaun.,§ which is restricted to the island, where it was first discovered by Macgillivray. So far as our researches enabled us to judge, *Phyllodactylus Guentheri* is the commonest, the distribution of this and the other species being very general, not only on the main island, but also on Goat Island and the Admiralty Islets.

They may be sought for on dry stony ground, under stones, amongst dry leaves, and at the feet of low scrubby trees.

As before stated there are no snakes, nor did we see any trace of fresh-water chelonians. The creeks are much too shaded and protected; indeed there is only one, the Deep Creek, passing Wright's (now Johnston's) Farm, in the slightest degree fitted for their existence. Turtles are, however, known to occasionally frequent the shores of the island. Formerly, according to the statements of Mr. E. S. Hill, during the earlier days of the island's history, they were plentiful. He says:—"Innumerable quantities of of exceedingly fine turtle frequent this place in the summer time, but at the approach of winter they all go to the northward."¶

In the paucity of its reptilian fauna Lord Howe resembles the Sandwich Islands.

Pisces.—The Fish-fauna of Lord Howe is of a remarkably interesting nature, and on the whole, of a decidedly Australian facies. It is an entirely new and unworked field for the Ichthyologist, as we are destitute of a systematic description, or even catalogue, of the fish of this isolated spot in the South Pacific. Mr. J. Douglas Ogilby informs me that Dr. Albert Günther, F.R.S., only mentions three species as found there, *Serranus*

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* Proc. Lin. Soc., N. S. Wales, 1883, VII, part 1, p. 87.

† Proc. R. Geogr. Soc., XXII, p. 138.

‡ Cat. Lizards, Brit. Mus., 2nd Edit., 1888, I, p. 90, t. 7, f. 3.

‖ *Ibid.*, p. 152.

§ *Ibid*, 1887, III, p. 269, t. 20., f. 1.

¶ Hill's *Lord Howe Island*, *loc. cit.*, p. 9.

Dæmelii, Günther, obtained during the voyage of the "Herald"; *Plectropoma cinctum*, Günther; and *Trachypoma macracanthus*, Günther.

The specimens obtained during our late visit were one hundred and fifty-five in number, distributed over about thirty-two genera, and between thirty-five and forty species. Except a few, too young to be identified, all are of interest, and some, such as *Tetragonurus*, of especial interest and value. The identification of the genera and species has been carried out by our colleague, Mr. J. Douglas Ogilby, whose appendix to the present sketch will be read with much interest. On glancing through the list given below, the reader will be at once struck by the number of important food fish inhabiting the waters around Lord Howe, a fact to be dwelt on later.

Serranus Dæmeli, Günther, the Black Rock Cod or "Sea Perch," and one of the best marketable fish in Sydney, is common, and of large size. The largest seen by us, was one hooked by Mr. Thorpe, which could not have been less than between 80 and 90 lb. An excellent spot for Rock-cod fishing will be found at the western base of Mount Gower, off the Erskine Valley, and the rocky ledges to the east of Ned's Beach, where our monster was hooked. Other members of the *Percidæ* obtained were *Plectropoma cinctum*, Günther, a Norfolk Island species, and *Trachypoma macracanthus*, Günther, said to be restricted to Norfolk and Lord Howe Islands.

The so-called Salmon, *Arripis salar*, Rich., is very common, especially within the Lagoon, where we caught numerous examples, ranging from a few ounces to 3 or 4 lb. in weight. Notwithstanding the reputed poisonous qualities of *A. salar*, we partook freely of it, and did not experience any unpleasant symptons, nor did we hear of any evil effects arising from its consumption by the Islanders. It is poisonous probably only when stale.

Of the tropical family Squamipinnes, two genera were caught, the Sweep, *Scorpis æquipinnis*, being the most important. The Sparidæ, or Sea Breams are represented by *Girella cyanea*, Macleay, with which the seas around the islands are teeming. It is one of the most important food fish obtained there, and would yield large results to well conducted fishing operations. No species commends itself more highly for carriage to the Sydney market than *G. cyanea*, both from its size, plentitude, the firmness of its flesh, and ease with which it is caught. It reaches a size of fifteen pounds, and is one of the most exquisitely, although uniformly coloured fish, caught off Lord Howe Island.

Two members of the curious family *Scorpænidæ*, were secured—one, a handsome *Scorpæna*, and a dried example of *Pterois volitans*, Linn., presented by Mr. W. E. Langley. "These fish possess in various degrees of development those skinny appendages resembling the fronds of sea-weeds, by which they either attract other fishes, or by which they are enabled more effectually to hide themselves."* Two other edible forms, members of the Carangidæ, are a species of *Caranx*, a very large fish, allied to the Horse Mackerels; and the *Seriola Lalandi*, C. & V., the King-fish, called "Yellow-tail" by the Islanders, but not the yellow-tail of Port Jackson. It would be of great assistance in unravelling the confusion existing among the local names of fish if a catalogue of the same could be compiled, showing their application to the different species throughout the Australian seas. As a case in point the Rev. J. E. T. Woods remarks† that *Seriola Lalandi*, although called "Kingfish" in New South Wales, is not the fish of that name caught in Victorian waters, nor that known under a similar designation in Tasmania.

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* Günther, *loc. cit.*, p. 413.

† Fish and Fisheries of New South Wales, 1883, p. 59.

We were not successful in obtaining any of the Fishing Frogs, but Mr. Campbell Stevens, the postmaster presented an example of the pelagic *Antennarius coccineus*, Les. & Garn. This and its congeners are tropical forms attaching themselves to masses of seaweed. Their habits when inshore, appear to be those of concealment under and amongst stones, from whence they descend on their prey. To Mr. Stevens we are again indebted for the second example known of *Tetragonurus Wilkinsoni*, Macleay, originally brought from Lord Howe by the Visiting Magistrate, Mr. H. T. Wilkinson,* and described by the Hon. W. Macleay,† under the name of *Ctenodax*. It was subsequently shown by Mr. Macleay,‡ on the authority of Dr. E. P. Ramsay, to be referable to the genus *Tetragonurus*, Risso., a scarce deep sea fish found in the Mediterranean, and off Madeira. The general name of "Coral-fish" has been applied to numerous fish frequenting tropical coral-reefs, although appertaining to various families. Under this appellation in our collection may be mentioned a species of *Apogon*, with coloured spots on the tail, also met with at Norfolk Island; *Plesiops nigricans*, Rüpp., one of the Nandidæ, this being, in the opinion of Mr. Ogilby, a far south station for its occurrence; and a blue-spotted *Pomacentrus*, to which the same remark may be applied. One mullet only can be so far recorded from Lord Howe, *Myxus elongatus*; it is, however, tolerably common.

The Lagoon is frequented in quantity by a Gar-fish or Half-beak, *Hemirhamphus intermedius*, easily taken from a boat with fine tackle. Amongst other forms obtained were,—a Herring, *Spratelloides gracilis*, Sehl.; the semi-pelagic *Gonorhynchus Greyi*, Rich., the "sand-eel" of the New Zealand Colonists; one of the "Skippers," *Scombresox Forsteri*, C. & V.; and two Wrasses, *Labrichthys luculentus*, Rich., and *L. inscriptus*, Rich.

Three fish to which more than passing attention should be called are a new species *Hoplodactylus Etheridgei*, Ogl., caught in a small pool on the largest of the Admiralty Islets; and a red Sucking-fish, *Diplocrepis costatus*, Ogl., found for the first time at Lord Howe.

Passing to the Murænidœ, it is interesting to note the occurrence of the common eel, *Anguilla australis*, Rich. It is tolerably common in many of the dark deep pools in the gullies both of the North Ridge and the southern hills, more especially the Deep Creek. Here our specimen was obtained by the guide, W. Nicholls, following a most exciting chase by the whole party after more than one fish. Individuals are obtained up to 5 and 6 lb. weight. Under blocks on the Coral-reef are found the beautiful striped eel, *Muræna nebulosa*, Ahl., which afforded equally good sport, whilst endeavouring to secure it in a "billy." The common green eel, *M. afra*, was also caught on the reef, although it usually frequents holes and crevices in the rocks.

The Sclerodermi are very plentifully represented by *Ostracion diaphanus* Bl., the Box or Coffer-fish, their bony envelopes strewing the sandy beach of the Lagoon in quantities. We were not successful in obtaining any Gymnodont fish, but Mr. Robin presented a new Globe-fish or Sea Hedgehog, *Tetrodon callisternus*, Ogl.

I have omitted to mention that sharks of a large size sometimes visit the lagoons. During the visit of Mr. A. H. Taylor, of the Department of Mines, to Lord Howe in March, 1886, a Tiger Shark, said to be *Galeocerdo Rayneri*, M'D. & B., was seen in the Lagoon, and would have attacked some bathers had not timely warning been given.

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* Since these pages have been in type we have had to deplore the death of this highly accomplished gentleman.

† A remarkable fish from Lord Howe Island. Proc. Linn. Soc., New South Wales, 1886, x, pt. 4, p. 718.

‡ Note on *Ctenodax Wilkinsoni*, *loc. cit.*, XI, pt. 2, p. 511.

The following is a list of the principal genera and species, as determined by Mr. Ogilby:—

- Serranus Dæmeli, *Günther.*
- Plectropoma cinctum, *Günther.*
- Trachypoma macracanthus, *Günther.*
- Arripis salar, *Rich.*
- Apogon norfolcensis, *Ogl.*
- Atypichthys strigatus, *C. & V.*
- Scorpis æquipinnis, *Rich.*
- Girella cyanea, *Macleay.*
- Haplodactylus Etheridgei, *Ogl.*, (sp. nov.)
- Scorpæna Cookii, *Günther.*
- Pterois volitans, *Linn.*
- Plesiops nigricans, *Rüpp.*
- Pempheris Unwinii, *Ogl.* (sp. nov.)
- Tetragonurus Wilkinsonii, *Macleay.*
- Caranx georgianus, *C. & V.*
- Seriola Lalandii, *C. & V.*
- Antennarius coccineus, *Less & Garn.*
- Gobius æolosoma, *Ogl.* (sp. nov.)
- Salarias quadricornis, *C. & V.*
- Myxus elongatus, *Günther.*
- Diplocrepis costatus, *Ogl.*
- Heliastes hypsilepis, *Günther.*
- Labrichthys luculenta, *Rich.*
- Labrichthys inscripta, *Rich.*
- Pseudoscarus, sp.
- Stethojulis axillaris, *Q. & G.*
- Hemirhamphus intermedius, *Cant.*
- Scombresox Forsteri, *C. & V.*
- Gonorhynchus Greyi, *Rich.*
- Spratteloides gracilis, *Sehl.*
- Solenognathus spinosissimus, *Günther.*
- Anguilla australis, *Rich.*
- Muræna nebulosa, *Ahl.*
- Muræna afra, *Bl.*
- Monacanthus howensis, *Ogl.* (sp. nov.)
- Ostracion fornasini, *Bianc.*
- Ostracion concatenatus, *Bl.*
- Tetrodon callisternus, *Ogl.* (sp. nov.)

In concluding this brief and fragmentary review of the fish of Lord Howe, it may not be out of place to consider the position and prosperity of the island in relation to the future fish supply of the large coast towns of New South Wales. As at present existing, the supply of fresh fish to Sydney and its suburbs, especially the latter, is lamentably deficient. For many years doubtless the fishing-grounds of the main-land coast will be quite capable of supplying any increased demand which may spring up. On the other hand, a time will come when even this supply will be insufficient, both from an increasing population, decrease quantities of the fish caught, and other causes. Public attention will then be directed to Lord Howe Island, as the one place capable of at once affording a good, wholesome, and copious supply of food-fish, within easy distance of the coast, and affording facilities for the prosecution of the industry. The greater part of the island itself, from its peculiar physical conditions, is practically useless for either agricultural or pastoral purposes, and has, in the meantime, been wisely declared by Government a botanical reserve. It is, however, most favourably situated for a fishing station, within easy reach of Port Jackson by fast steam packets. Even a ketch covers the distance, with a favourable wind, in three days—the surrounding seas teeming with fish—the Lagoon forming a safe anchorage for small craft in almost any wind—and the entrances capable of great improvement, so that small draft supply steamers could also be admitted, except in the foulest weather—and finally, excellent sites for the accommodation of a fishing population. Everything tends to indicate that the future of Lord Howe Island is interwoven with the question of the fish supply of New South Wales.

Polyzoa.—Beyond the fact that few species were obtained, little can be said of the Polyzoa. In all probability had our arrangements for dredging been better our success would have been greater. The following are the species obtained, as determined by Mr. Whitelegge:—

Schizoporella hyalina, *Linn.*
,, tuberosa, *Reuss.*
Aetea recta, *Hincks.*
Scruparia chelata, *Linn.*
Menipea cervicornis, *M'Gillivray.*
Bugula neritina, *Linn.* (with avicularia).
Catenicella elegans, *Busk.*
,, venusta, *M'Gillivray.*
Discoporella novæ-zelandiæ.
Idmonea, sp.
,, radians, *Milne Edw.*
Steganoporella, sp.
Lepralia, sp.
Membranipora, sp.

Mollusca.—The distribution of molluscan life at Lord Howe Island may be considered under four aspects, that of the Coral-reef, that of the Lagoon within it, that of the shore generally, irrespective of the former, between high and low-water marks, and the deep water shells. In fact, it may be said that these remarks apply generally to the whole marine fauna. As previously stated, we were able to study the Coral reef and its objects only at its extreme northern and southern ends, where, however, it was found to be very rich in life. The Lagoon, on the other hand, proved very barren, much to our surprise, but it is possible that our dredging operations might have yielded better results could we have had the assistance of steam-power. The general sameness of marine life cast upon its sandy beach would support the opinion that it is not prolific in objects of interest. The shore fauna differs essentially from that of the Coral-reef, chiefly in its simplicity, and the superabundance of a few special forms. Of the deep water fauna we are practically ignorant, the state of the weather during the greater portion of our residence there and the want of adequate apparatus quite putting a stop to any possible investigations. Mr. John Brazier has named the whole of the Mollusca.

It may be naturally inferred that our gatherings in the Cephalopoda, the highest group of the Mollusca, were of a very limited nature. In fact, we obtained three representatives of the Decapoda, ***Spirula Peroni***, Lamk., ***Onychoteuthis Banksi***, Leach, and ***Sepia latimanus***, Q. & G. The posthorn-like shells of the former cover some parts of the Lagoon beach in hundreds, and at those spots it is impossible to walk without crushing numbers of this beautiful species. Greatly to our delight, we were fortunate enough to find one example of *S. Peroni* with nearly the whole of the body preserved, but the head and tentacles had been removed.

Amongst the Prosobranchiate Gasteropoda we found that *Fusus Hanleyi*, Angas, a shell common in Port Jackson, was exceedingly rare at the island, but of the genus *Nassa* three species were obtained, *Nassa mucronata*, A. Adams, *N. elegans*, Kiener, a West Australian shell, and *N. paupera*, Gould. These shells were found on the Coral-reef, and on the rocky ledges at Ned's Beach, but they are all rare. *Purpura succincta*, and its vars. *textilosa* and *striatus* are all characteristic shells on the reef at the foot of Mount Ledgbird, especially *P. succincta*, with its coarse concentric costæ. Next to *Turbo imperialis* it is the largest univalve we have met with. *Purpura amygdala*, Kiener, is also obtainable, and is a very interesting shell from its wide distribution from our own coasts to those of Western Australia. Wherever the nature of the shore permitted an inspection to be made we found *Sistrum chaidea*, Duclos, very common between tide marks on rocks and stones. So also was *Cominela* (*Adamsia*) *tritoniformis*, Blainv. Could an examination of the middle portions and outer face of the reef have been made *Voluta* would doubtless have proved of more common occurrence. As it was, only three specimens of *Voluta nucleus* were met with. On the other hand, both on the Coral-reef, and on the basaltic reefs and edges on the east coast, Cowries were tolerably abundant. *Cypræa annulus* is common, *C. caputserpentis*, Linn., is moderately so, but *C. staphylæa*, Linn., is not by any means plentiful. *C. erones*, Linn., occurs in numbers, but *C. felina*, Gray, is very rare. Mr. Brazier has recognized what he believes to be one example of *Cypræa moneta*, Linn.

Potamides either exists, or has existed at Lord Howe. A single dead specimen of *Potamides ebininus*, Brug., so common on our estuarine shores was picked up. It is remarkable that a mollusc occurring in such numbers when it is met with, should be so rare in the present instance. It may perhaps indicate one of those mysterious disappearances of a species of which several partial instances have occurred in Port Jackson.

The Mitridæ are well represented by the genera *Mitra*, *Engina*, and *Columbella*, especially the latter. Of the first genus there is *Mitra scutularia*, Chem.?, a rare shell, and another peculiar small species mottled black and white. Both species of *Engina* are rare, which is to be regretted, as the var *maculata* of *E. lineata*, Reeve, is a small but very pretty shell, marked with dark spiral lines and dots. *Columbella versicolor*, Sby., occurs, but unlike those of this coast and Northern Australia, the individuals are all small. *C. Tyleri*, Gray, is tolerably common, but the other species are not so. Species of the sub-genus *Æsopus* was obtained, which may perhaps be new. The reason advanced in the case of the Volutes will also probably account for the paucity of the Cones, as three species only were obtained. *Conus anemone* Lamk., found under stones and blocks, is the most abundant. *C. ebreus*, Brug., the next so, whilst *C. coronatus*, Dilw., is limited in numbers. Amongst truly tropical shells we obtained at Ned's Beach a few examples of *Scalaria perplexa*, Pease. The Cerithiidæ are represented in the collection by dead shells of *Lampania australis*, Quoy, all of them distorted. Either it must have entirely got out of its latitude or the immediate physical conditions surrounding the settlement must have been uncongenial.

One of the commonest shells at Lord Howe, but very local in its distribution, is *Planaxis mollis*, Sby., always found in some hollow space under a large stone, associated in large numbers. We obtained a quantity in this way on the north-west extension of the Coral-reef in North Bay.

The Littorinidæ are another strongly developed family. The widely distributed *Littorina diemenensis*, var. *mauritiana*, is found wherever there are rocks along or above high-water mark. Both the black basaltic rocks and the coral-sand rock, where forming reefs and ledges, are frequented by this shell, which appears to be equally indifferent whether it is lapped gently by the incoming tide, or remains high and dry some feet above flood water-mark, and dependant only on spray. It is a remarkable fact that it may be found covering the rocks at some points, in large numbers, whilst, without the slightest indication why, many square feet of similar rock in a like position, are almost deserted by it, and its place taken either by a *Patella* or *Nerita*. In a similar dry position the writer obtained several examples of *Littorina nodulosa* on the basaltic spurs running out from the north extremity of Ned's Beach, but the shell does not appear to be by any means common. Still rarer than this species is *L. plicata*, Linn., obtained on the blocks of basaltic rock strewn on the ledges to the south of Ned's Beach, but in this case always between tide marks, and fully covered at high water. Of the rarer forms of *Littorina*, *L. undulata*, Gray, was also collected.

The Neritidæ are an equally interesting group of shells, both from their prevalence and general distribution. *Nerita melanotragus*, E. A. Smith, occurs in thousands everywhere, but more particularly at those points where the beach, between tides is composed of the coral-sand rock forming the low-lying portions of the Island. On the off-lying islets, especially Rabbit Island, and along the east coast generally this species is decidedly smaller, than when found on the rocky ledges between the landing place and the Old Settlement, where some fine specimens can be obtained. *L. melanotragus* is found plentifully on the coast of New South Wales, and also at Norfolk Island. Another common form is *Nerita antiquata*, Recluz, a shell found on the Victorian coast, but rare here. On the south shore end of the Coral-reef the most typical shell is *Turbo imperialis*, Linn., with its wonderfully massive operculum. Notwithstanding its frequency, however, it is difficult to obtain cabinet specimens, the shell appearing to have a natural affinity for the growth of an incrusting nullipore, and other epiphytic organisms. Associated with *T. imperialis*, although in less numbers, we found *Purpura succincta* already mentioned, and numerous examples of *Dolium variegatum*, Lamk. An immense specimen of this shell was brought from Lord Howe, by the Visiting Magistrate, Mr. H. T. Wilkinson, and exhibited at the Linnean Society, Sydney,* measuring about nine inches in its longest diameter, by a transverse measurement of eight inches. At the meeting in question, Mr. Brazier stated that the species had not previously been found so far east of the mainland of Australia.

Only two species of *Trochus* were found, one, *T. Torresi*, and another known to Mr. Brazier only, from Western Australia. The place of *Trochus* is taken by the little trochoid *Ricella plicatula*, Phil., another Norfolk Island shell. It seems to love crawling over small stones, on a more or less flat beach, especially if of a muddy nature. Such patches are to be found on a part of the foreshore of the Old Settlement, and around Rabbit Island, where it is very plentiful. A small form of *Haliotis* is plentiful on the Coral-reef, the largest examples averaging about one inch in diameter. We did not observe any of the larger species of this genus. Although found on the Coral-reef it cannot be said that *Patella* is common there, but here and there along the coast line *P. tramoserica*, Martin, becomes more so; whilst at the Admiralty Islets it acquires a much larger size, and is decidedly more plentiful. One specimen of *Siphonaria denticulata*, Q. & G., common to Port Jackson and New Caledonia, was taken on Rabbit Island; and several examples of *Scutus unguis*, Linn., var. *corrugatus*, Reeve, were found on the Coral-reef. The Chitonidæ are sparsely represented by a small *Chiton*, and two species of *Anthochites*, and were attached to stones on the Coral-reef.

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* Proc. Linn. Soc. N. S. Wales, 1885, x, p. 696.

Dead specimens of *Triton cynocephalus*, Lamk., and *Pterocera chiragra*, var. *rugosa*, Sby., were found, but Mr. Brazier, without additional evidence, is disinclined to regard these as other than conveyed to the island through human agency. They are New Caledonia species, and have not been traced so far to the south-east before.

The relative prevalence of *Patella* and *Siphonaria* seems to be exactly the opposite of the Rev. J. E. T.-Wood's experience on the north-east coast of the Continent. In the neighbourhood of Trinity Bay he found *Siphonaria* to be the characteristic genus, whilst in our own case it is *Patella*.*

The remaining groups of the Gasteropoda are but feebly represented in our collection. Of the Tectibranchiata we have only three, *Bulla*, *Pleurobranchus*, and *Aplysia*. The former is represented by a few examples of *B. ampulla*, but all dead specimens; the latter by *Aplysia tigrina*, Rang.

The Nudibranchs would probably reward a more vigorous search than we were able to give, two genera only coming under our notice, a species of *Onchydium*, and *Dolabrifera Brazeri*, Sby. The Heteropora are of more importance from the plentiful occurrence of *Ianthina*. This beautiful genus is represented by two species—*I. casta*, Reeve, and *I. exigua*, Lamk. The former is scattered in thousands on the sandy beach of the Lagoon, invariably coming on shore with the mollusc *in situ*. The latter is the beautiful high-spired species, with the well marked sinus in the outer lip of the mouth. From amongst the immense number of the commoner form examined by us, only two specimens of this species were found.

The group to which the greatest interest attaches itself is certainly the Pulmonifera. Thanks to the untiring exertions of Mr. Whitelegge, we are able to extend this division of the Mollusca by no less than seven undescribed species. A curious resemblance exists to some extent between Lord Howe Island and the Sandwich Islands. Not only are both widely isolated, but in the former the land shells are said by Wallace† to be peculiar to the group, and they are certainly so in the case of Lord Howe. A further resemblance takes place in the very small number of Operculate Pulmonifera existing on both groups of islands—in the case of our island, only three genera. More attention has been paid to the land shells of Lord Howe than to any other group of Mollusca found there through the researches of Pfeiffer, Cox, Brazier, and Gaskoin, and collections made by the late Mr. Macgillivray, Mr. G. Masters, and Mr. A. Morton. From a short note by Mr. Brazier in 1869,‡ it appears that Macgillivray alone collected four species of *Helix*, a *Bulimus*, four *Diplommatina*, and an *Omphalotropis*.

The genus *Helix* is represented by no less than ten species. The typical form, characteristic of Lord Howe, *Helix Sophiæ*, Gaskoin,§ is scattered freely over the whole island, and extends to a comparatively high altitude on Mount Ledgbird. In the lower lying portions of the island, in well-wooded localities, but not in the open flats, it is very plentiful under dead timber, bark, and fallen palm leaves. We particularly noticed its prevalence on soil formed of the decomposed Coral-sand rock, the dead shells in places strewing the ground in thousands. On Rabbit Island, *H. Sophiæ*, assumes a more elongated character, and Mr. Brazier proposes to distinguish this as the variety *conica*. On the summit of Mount Ledgbird, the place of *H. Sophiæ* is taken by an equally large, if not somewhat larger species, *Helix howinsulæ*, Cox.[*] In describing the original specimens collected by Mr. E. S. Hill, Dr. Cox says simply "on a mountain," but examples brought us by Mr. G. Nichols, prove this to be Mount Ledgbird (2,504 ft.), where it occurs from the summit downwards. The little Rabbit or Goat Island does not appear to have a species peculiar to itself, for *H. Catletti*, Brazier,[†] the common species there, occurs on the main island. On the eastern flanks and spurs of Mount Ledgbird we collected a small *Helix*, at a height of 800–900 ft., which Mr. Brazier proposes to call *Helix Ledgbirdi*. It is a pretty little turreted and variegated shell, and may be found after rain crawling on the basaltic boulders and blocks strewn over the flanks of this inaccessible hill, but in dry weather it takes refuge in the large vesicular cavities of the basalt. On the low grounds at the northern end of the island, amongst cultivated ground a small species was found in numbers to which the name of *H. Unwini*, Brazier, is attached, in compliment to Mr. H. A. Unwin, who joined our party as a volunteer worker. The humid gullies and moist hill flanks, running from the North Ridge to the Old Settlement, afforded a prolific hunting ground. There, amid loam, decaying wood, and under stones, were obtained numbers of small Helices, which Mr. Brazier proposes to designate *H. Whiteleggi;* a very finely but regularly transversely striated species, *H. Balli*, a rare form, named in honour of Lieut. Ledgbird Ball, the discoverer of Lord Howe Island in 1788; and lastly, *H. Wilkinsoni*, a pretty, flatly coiled, and equally rare shell, after the late Mr. H. T. Wilkinson, Visiting Magistrate. In addition to the species already mentioned, two others have been described, but we failed to rediscover the last named, viz., *H. textrix*, Pfr.,[‡] and *H. cimex*, Pfr.;[§] the latter a dark brown shell, with a perspective umbilicus. The former is said, by Mr. A. Morton,[‖] to occur "on Mount Gower, 2,840 feet above the level of the sea," *i.e.*, on the summit. A fine new species of *Vitrina* was found on the stems and leaf sheaths of the palms growing on the lower grounds, (*Kentia Belmoreana*, the "Curly Palm," and *Kentia Forsteriana*, the "Thatch Palm"), and is called by Mr. Brazier, *Vitrina Etheridgei*. In a similar position we also found *Helicarion Hilli*, Cox,[¶] but did not trace it above a height of 400 to 500 feet. On the other hand Mr. Morton quotes[**] *Helix Hilli*, from the summit of Mount Gower, but as there is no species of that name on the Island, he probably refers to the *Helicarion*.

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* Proc. Linn. Soc. N. S. Wales, v, pt. 2, p. 112.

† Island Life, 1880, p. 303.

‡ "Lord Howe Island," *Sydney Morning Herald*, 1869, LIX, No. 9,694 (June 16th), p. 8.

§ Proc. Zool. Soc., 1854, p. 152.

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[*] Description of new Land Shells from Australia and the Solomon Islands. *Proc. Zool. Soc.*, 1873, p. 148.

[†] Description of Six new species of Land Shells from Australia and Lord Howe's Island, *loc. cit.*, 1872, p. 617.

[‡] Proc. Zool. Soc., 1885, p. 92.

[§] *Ibid*, 1854, p. 288.

[‖] Report to the Trustees of the Australian Museum, (*Lord Howe Island, Present State, &c.*), 1882, p. 12.

[¶] Description of New Land Shells from Australia and the Solomon Islands. *Proc. Zool. Soc.*, 1773, p. 151, t. 16, f. 7, a-b.

[**] *Loc. cit.*

Some years ago Mr. Brazier described [*] a species of *Tornatellina* from Lord Howe, but from the fact that only one fragment was found amongst our large gatherings from the North Ridge gullies, it must be very rare. In the paper referred to he also described *Simpulopsis Mastersi*,[†] one specimen of which occurs in the present collection.

Equal only in abundance, even if not commoner than the characteristic *Helix Sophiæ*, is *Bulimus bivaricosus*, Gaskoin,[‡] found everywhere under cover, and in immense numbers. Like the *Helix*, this shell appears to avoid open spaces as a rule, and prefers shady damp situations and the scrubby hill sides where composed of the Coral-sand rock. It is sparingly represented even at the higher altitudes, being reported as seen under the "wall" of Mount Ledgbird. The egg-cases are usually met with at the base of the palm leaf sheaths, between the latter and the stems. There is great variation exists in the thickness of the shell of this species, and I believe it was on a thin shelled variety that Dr. Cox established his *Bulimus cuniculinsulæ*.[§] It occurs on Rabbit or Goat Island, and is, as Dr. Cox says, both smaller and lighter than the typical form of the main island. Numbers of gradations can, however, be traced amongst a series of the latter, and it seems more in keeping with facts to regard the Rabbit Island shell simply as a variety. This variation in the thickness is carried to the extreme condition in the subfossil examples of *B. bivaricosus*, in which the shell becomes thickened to an enormous extent, but in this case even gradations can be traced to the existing condition of the species. This variety I purpose calling *B. bicaricosus*, var. *solida*. We may now pass to the operculate section of the Pulmonifera consisting of three genera and seven species. Two forms are common, *Omphalotropis exquisita*, Pfr.,[||] and *Diplommatina Macgillivrayi*, Pfr.,[¶] both originally collected at Lord Howe by the late J. Macgillivray. Two other species of the last genus were collected both by Macgillivray and ourselves, *D. capillacea*, Pfr.,[**] and *D. Cantori*, Pfr.,[††] but are not as plentiful as the former shells. A fourth species of *Diplommatina* is said by Dr. Pfeiffer to exist on Lord Howe, called by him *D. chordata*,[‡‡] but we did not obtain it. The list may be concluded by one specimen of *Realia*.

Under very trying circumstances we were fortunate enough to discover fresh water non-pulmoniferous forms at a considerable height on the eastern flanks of Mount Ledgbird in steep gullies running down to the shore. These consisted of two species of *Bythinella*, crawling over stones. One, a spirally striated shell, with a deep suture, will be described as *B. Whiteleggei*, by Mr. Brazier, and the other as *B. Ramsaii*, as an appreciation of the interest taken in our proceeding by the Curator of the Australian Museum.

The bivalve mollusca (Pelecypoda) are not largely represented at Lord Howe Island. Within the Lagoon at, and a little below low water-mark, occur *Pinna* (sp. nov. ?), *Lucina interrupta*, Lamk., *Cardium unedo*, Linn., and *Mesodesma glabrata*, Lamk., all, with the exception of the last, very common. Large numbers are cast upon the beach, but they may be obtained wherever the sand has a slight admixture of argillaceous matter, as at the north end of the Lagoon, off the Old Settlement. *Cardium unedo*, the "Strawberry cockle," exhibits endless varieties in its colouring. Some are almost colourless, others with a few of the strawberry seeds on the anterior sides; others yellow tinted towards the ventral margins, or even a delicate red tint; some have the red specs carried on to the posterior slopes, whilst again many are beautifully besprinkled across the whole breadth of the valves. The colourless condition appears to represent old shells.

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[*] Description of six new species of Land Shells from Australia and Lord Howe's Island *Proc. Zool. Soc.*, 1872, p. 619.

[†] *Loc, cit.*, p. 619.

[‡] Proc. Zool. Soc., 1854. p. 152.

[§] Description of new land shells from Australia and the South Sea Islands. *Proc. Zool. Soc.*, 1872, p. 19, t. 4, f. 3.

[||] A Monograph of the Genera *Reilia* and *Hydrocena*. *Proc. Zool. Soc.*, 1854, p. 307 (=*O. Pfeiferi*, Crosse).

[¶] Descriptions of eighteen new species of Cyolostomacea from Mr. Cuming's Collection. *Proc. Zool. Soc.*, 1854, p. 303.

[**] *Ibid*, p. 303.

[††] Descriptions of sixteen new species of Pneumonopoma from the Collection of H. Cuming, *Proc. Zool. Soc.*, 1856, p. 336.

[‡‡] Proc. Zool. Soc., 1855, p. 105.

The genus *Pecten* is peculiar by its absence. We did not meet with many bivalves of importance on the reef, but the commoner forms are *Mytilicardia variegata*, Brug.; two species of *Avicula*, *A. fimbriata* Reeve, *and A. malleoides*, Reeve; a few *Lima multistriata*, Sby.; two species of stunted oyster, a *Modiola* met with in all the pools and crevices, but specifically unknown to Mr. Brazier; and two species of *Arca*, *A.* (*Litharca*) *decussata*, Sby., and *A. divaricata*, Sby. The first is moderately common, and distorted into all sorts of shapes; whilst the latter, unlike individuals from the more tropical islands of the Pacific, are small and uncommon. Perhaps the most characteristic bivalve found on the reef is a small clam, *Tridacna elongata*, Lamk., lying half buried in cracks and depressions of the surface. It is also found on the rocky ledges of the east coast. An example of *Crassatella pulchra*, var. *Cumingi*, A. Ad., and a dead valve of *Pectunculus costatus*, Reeve, were also picked up. Neither Brachiopoda, nor Pteropoda were met with.

The following is the complete list of Mollusca collected, as determined by Mr. Brazier:—

Spirula Peroni, *Lamk.*
Onychoteuthis Banksi, *Leach.*
Sepia latimanus, *Q. & G.*
Fusus Hanleyi, *Angas.*
Ranella leucostoma, *Lamk.*
Nassa mucronata, *A. Ad.*
,, elegans, *Kiener.*
,, paupera, *Gould.*
Purpura succincta, *Martin.*
,, ,, *var.* striata.
,, ,, *var.* textilosa.
,, amygdala, *Kiener.*
,, Smithi, *Brazier* (sp. nov.)
Cominella tritoniformis, *Blainv.*
Ricinula morus, *Lamk.*
Sistrum chaidea, *Duclos.*
,, marginalba, *Bean.*
Voluta nucleus, *Lamk.*
Columbella versicolor, *Sby.*
,, Tyleri, *Gray.*
,, varians, *Sby.*
,, Cumingi, *Reeve.*
,, sp.
Engina armillata, *Reeve.*
,, lineata, *Reeve.*
Mitra scutulata, *Chem. ?*
,, sp.

Vermetus, sp.
Cypræa erones, *Linn.*
,, moneta, *Linn. ?*
,, annulus, *Linn.*
,, caputserpentis, *Linn.*
,, staphylæa, *Linn.*
,, felina, *Gray.*
,, vitelus, *Linn.*
Natica picta, *Recluz*, var.
Dolium variegatum, *Lamk.*
Scalaria perplexa, *Pease.*
Conus anemone, *Lamk.*
,, ebreus, *Hwass.*
,, coronatus, *Dilo.*
,, capitaneus, *Linn.*
,, vermiculatus, *Hwass.*
Strombus floridus, *Lamk.*
,, luhuanus, *Linn.*
Vertagus obeliscus, *Brug.*
Cerithium, sp.
Lampania australis, *Quoy.*
Potamides ebeninus, *Brug.*
Littorina diemenensis, var. mauritiana, *Lamk.*
,, nodulosa, *Gmelin.*
,, undulata, *Gray.*
Planaxis mollis, *Sby.*
Hipponyx antiquatus, *Linn.*
Nerita melanotragus, *E. A. Smith.*
,, antiquata, *Recluz.*
,, albicella, *Linn.*
,, plicata, *Linn.*
Turbo imperialis, *Linn.*
Trochus Torresi, *E. A. Smith.*
Clanculus, sp.
Ricella plicatula, *Phil.*
Thalotia, sp.
Haliotis, sp.
Patella tramoserica, *Martin.*
Scutus unguis, var. corrugatus, *Reeve.*
Siphonaria denticulata, *Q. & G.*
Chiton, sp.
Anthochites, sp.
Bulla ampulla, *Linn.*
Aplysia tigrina, *Rang.*
Pleurobranchus, sp.
Onchydium, sp.
Dolabrifera Brazieri, *Sby.*
Ianthina exigua, *Lamb.*
,, casta, *Reeve.*
Helix Sophiæ, *Gask.*
,, ,, *var.* conica, *Brazier* (var. nov.).
,, howinsulæ, *Cox.*
,, Catletti, *Brazier.*
,, Whiteleggei, *Brazier* (sp. nov.)

Helix textrix, *Pfr.*
„ Ledgbirdi, *Brazier* (sp. nov.).
„ Balli, *Brazier* (sp. nov.)
„ cimex, *Pfr.*
„ Unwini, *Brazier* (sp. nov.).
„ Wilkinsoni, *Brazier* (sp. nov.).
Bulimus bivaricosus, *Gask.*
„ „ *var.* cuniculoides, *Cox.*
Helicarion Hilli, *Cox.*
Vitrina Etheridgei, *Brazier* (sp. nov.).
Tornatellina inconspicua, *Brazier.*
Simpulopsis Mastersi, *Brazier.*
Omphalotropis exquisita, *Pfr.*
„ Pfeifferi, *Crosse.*
Realia, sp.
Diplommatina Macgillivrayi, *Pfr.*
„ capillacea, *Pfr.*
„ Cantori, *Pfr.*
„ chordata, *Pfr.*
Bythinella Whitleggei, *Brazier* (sp. nov.).
„ Ramsayi, *Brazier* (sp. nov.)
Ostrea, sp. *a.*
„ sp. *b.*
Avicula fimbriata, *Reeve*
„ malleoides, *Reeve.*
Pinna, sp.
Lima multicostata, *Sby.*
Modiola, sp.
Litharca decussata, *Sby.*
Arca divaricata, *Sby.*
Pectunculus tenuicostatus, *Reeve.*
Chama, sp.
Tridacna elongata, *Lamk.*
Carduim unedo, *Linn.*
Lucina interrupta, *Lamk.*
Crassatella pulchra, *Reeve*, var. Cumingi, *A. Ad.*
Tapes literata, *Linn.*
Mesodesma glabrata, *Lamk.*
Mytilicardia variegata, *Brug.*

Tunicata—Ascidians are excessively common on the stones and blocks, and in the depressions and hollows of the Coral-reef, and many of a very marked appearance. Our knowledge of the Australian species is too limited to permit of any remarks being made.

Insecta—The Insecta, and allied classes were not made a special object of search, but were simply captured when presented to our notice. Indeed, the season was not sufficiently advanced for collecting one order at all—the Lepidoptera, a solitary individual being the only one seen and that shortly after our arrival.

So far as our collection can be taken as a test, the Coleoptera are the most abundant, and as it happens this order has been, through the researches of the Hon. W. Macleay, Mr. F. P. Pascoe, and Mr. A. S. Olliff, and others, more systematically worked out than the others. Amongst the Longicorn Beetles we obtained what is believed to be *Onemoplites Howei*, Thomson, and *Ceresium simplex*, Gyll. Two examples of *Blax Wollastoni*, White, were discovered, and also two of the beautiful green beetles peculiar to Lord Howe, *Lamprima insularis*, Macleay,[*] found by Mr. Thorpe, one on Rabbit Island, the other on the main island. Although not obtained during our visit it may be mentioned that Mr. Olliff has in course of description two species of Staphylinidæ—not hitherto recorded; one he calls *Hesperus pacificus*, differing from the mainland species, *H. hæmorrhoidalis*, Macleay, in several important particulars; the other is *Creophilus erythrocephalus*, Fab., an abundant and widely distributed species. The same author has already recorded[†] two species of Cucujidæ, viz, *Dendrophagus australis*, Erich., a widely distributed Australian form; and *Cryptamorpha Desjardinsii*, Guer., found on the banana trees of the Island, but probably introduced. The most numerously represented divisions of the Coleoptera are the Carabidæ, and Rhynchophora. Amongst the former we have the very uncommon *Scaraphites Macleayi*, Westw., a new discovery at Lord Howe, but found in New South Wales; *Chlænius peregrinus* Cast., a widely distributed Australian species, and one found in Norfolk Island. The *Rhynchophora* are all recorded species, but we were not fortunate enough to find any of them, although they are peculiar to Lord Howe Island, viz., *Orthorhinus lateralis*, Pasc.,[‡] *Tranes insularis*, Pasc.,[§] *Embaphoides pyxidatus*, Pasc.,[||] *Æthreus cicatricosus*, Pasc.,[¶] *Sphaeropterus barbipes*, S. & J., and *Hybomorphus melanosomus*, S. & J., the most peculiar form of insect found there; and lastly a strange, and perhaps new species of *Telephorus*, locally known as the "bug." By far the two commonest and most widely distributed beetles on Lord Howe are the little *Saragus exulans*, Pasc., and *S. Gulielmi*, Oll., to be found under every stone and in every rotten stump. They are peculiar to the island, and when disturbed immediately feign death, tucking their legs underneath the body and remaining still for an incredibly long time. Since our return from Lord Howe, Mr. W. E. Langley has brought from thence a true water-beetle of the family Dytiscidæ, referable to the genus *Cybister*. The Hymenoptera are conspicuous by their absence in our collection. Bees are plentiful and cultivated; but whether or no there is a native bee, we are unable to say. Nests are occasionally taken from the banyan trees, probably those of bees escaped from confinement, and I regret to say that I saw more than one instance of these noble trees felled for the purpose of obtaining the comb. As before stated, our visit was paid at too early a season for *Lepidoptera*, with the exception of a few *Heterocera*, chiefly small forms. There is, however, one exception in *Dasypodia cymatodes*, Guénée, which occurs under very interesting circumstances in some caves at the North Bay. These occur in the Coral-sand rock, and extend for a limited distance underground, the roofs of both being completely clothed by thousands upon thousands of this moth.

The most important members of the *Orthoptera* we obtained were a large *Blatta*, probably a new species, which is invariably found in and under decayed logs: a mole-cricket, *Gryllotalpa australis*, Eric., not hitherto recorded from the island; and an immature grasshopper of the genus *Phaneroptera*, and of which there appeared to be large numbers about. The so-called "Tree Lobster, " *Eurycantha australis*, Montr., peculiar to Lord Howe, was found to occupy the hollow trunks of the smaller trees along parts of the flats in some quantity. Their presence is at once discerned by the small heaps of droppings collected either at the open base of the hollow, or on the ground, at the foot of the tree inhabited by them. To obtain specimens, the hollow in the trunk must be followed out, and a hole cut at the particular spot occupied by the insect, their habit and power of closely clinging to an object preventing the adoption of any other method except, perhaps, that of smoking out. We found the females greatly predominating over the males. Since our return from Lord Howe Island, Mr. W. H. Langley has brought from thence a specimen of the Water Scorpion, *Belostoma indicum*, L. & S. It is, however, possible that it may have been introduced.

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[*] Revision of the Genus *Lamprima* of Latreille, &c. *Proc. Linn. Soc., N. S. Wales*, x, pt. 2, p. 137.

[†] Proc. Linn. Soc., N. S. Wales, x, pt. 2, p. 218 and 220.

[‡] Ann. Mag. Nat. Hist., 1882, IX, p. 381.

[§] *Ibid.* 1874, XIII, p. 387.

[||] *Ibid, loc. cit.* p. 419.

[¶] *Ibid*, 1875, XVI, p. 65, t. 1, f. 8.

The only Hemipterous insect met with by ourselves was an immature bug, belonging to the family Scutellaridæ, and perhaps even of the genus *Scutellera* itself. This bug was obtained in large numbers by the writer, on the flat at the back of Blenkinthorpe Beach, where it occurred in hundreds on the tree-trunks and branches, and covering many yards square on the ground. A few years ago a *Coccus* seems to have played sad mischief with the banyans. Mr. Duff remarks on this subject,—"I noticed with regret that many of the large banyan-trees (*Ficus columnaris*) on the low land were in an unhealthy and decaying state, mostly their leaves having fallen off, whilst those remaining were infected with an insect (*Coccus*) underneath the leaves, causing them to have a sickly yellow appearance. The *Coccus* insect is the same as that which attacked and damaged the Moreton Bay fig-trees in Sydney parks and gardens a few years ago."*

Passing to the Myriopoda, several forms of *Julus* are met with, particularly a slender black species. This occurs wherever there is a superabundance of rotton woody matter, and frequently at the bases of the palm sheaths, between the leaf stalks and the stem.

The first order of this class, the Chilopoda, is represented by a Centipede, *Heterostoma*, met with under much the same circumstances.

Lastly we obtained a number of Spiders, but these appear to be immature individuals, and of doubtful identity, and this group would undoubtedly repay further research. The following Arachnid genera are recorded by Mr. E. S. Hill—*Epeira*, *Lycosa*, *Olios*, *Thomisus*, *Clubiona*, *Delena*, and *Amourobius* (?)

The following is as complete a list of the "Insecta" of Lord Howe, using the term in its broadest sense, which it has been possible to get together.†

Cnemoplites Howei, *Thom.*
Leptops Etheridgei, *Oll.* (sp. nov.)
Blax Wollastoni, *White.*
Lamprima insularis, *Macleay.*
*Hesperus pacificus, *Oll.*
*Creophilus erythrocephalus, *Fabr.*
Scaraphites Macleayi, *Westw.*
Chlænius peregrinus, *Cast.*
Lestignathus fugax, *Oll.* (sp. nov.)
Dyscolus hilaris, *Oll.* (sp. nov.)
Diaphoromerus iridipennis, *Ch.*
*Orthorrhinus lateralis, *Pasc.*
*Tranes insularis, *Pasc.*

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* Report to the Hon. J. B. Wilson (*Lord Howe Island, Report on Present Prospects, &c.*), *loc. cit.*, p. 10. [This seems to be a mistake. The insect was the larva of a species of *Galeruca* (*Coleoptera.*)—E.P.R.]

† Those species marked with an asterisk are quoted from authorities.

*Embaphiodes pyxidatus, *Pasc.*
*Æthreus cicatricosus, *Pasc.*
*Hybomorphus melanosomus, *S. & J.*
*Sphaeropterus barbipes, *S. & J.*
*Dendrophagus australis, *Eric.*
*Cryptamorpha Desjardinsii, *Guer.*
Cybister tripunctatus, *Oliv.*
Nyctobates sterrha, *Oll.* (sp. nov.)
Telephorus apterus, *Oll.* (sp. nov.)
Saragus exulans, *Pasc.*
Saragus Gulielmi, *Oll.* (sp. nov.)
Dasypodia cymatodes, *Guénée.*
Blatta, sp. nov.?
Gryllotalpa australis, *Eric.*
Phaneroptera, sp.
Eurycantha australis, *Montr.*
Belostoma indicum, *L. & S.*
Scutellera, sp.?
Julus, sp.
Heterostoma, sp.

Crustacea.—This group does not call for a prolonged notice, although Crustacea may be found in great abundance, throughout the surrounding seas, and to a great extent on the rock-bound shores of the island. So far as Mr. Whitelegge has been able to determine them, from 27 to 30 genera, comprising 35 species, were collected, chiefly Decapods, with an Isopod, a Stomapod, and a few Cirripedia. In Dr. Haswell's Catalogue none are recorded from Lord Howe Island. The task of determining the collection has proved of no small difficulty to Mr. Whitelegge, from the almost entire absence of the more important illustrated works bearing on the subject.

The Carcinology of Lord Howe Island is practically an unworked branch, and its study would well repay the student of this interesting group, the large variety of forms to be obtained there having already been commented on by Mr. A. Morton.* No better hunting ground could exist than the deep pools, and rocky eastern coast of Lord Howe, and the numerous shelter places on the western Coral-reef. Although one or two rare forms were taken by us, we did not collect any of large size. The preponderance of Decapoda can hardly be taken as implying a superabundance of this division of the Crustacea, but only so far as came under our notice.

The Inachidæ are represented by a funny little species, *Menethius monoceras*, Lath., found on the Coral-reef amongst stones and weeds, and on the approach of the collector, sits up in a grotesque and semidefiant manner. It is widely distributed throughout the neighbouring tropical seas. The Canceridæ are, as regards genera, the most numerous, and a fair series were obtained, including three species of *Actœa*, especially *A. tomentosa*, M. Edw., another reef crab but remarkable only for its abundance. A second species is believed by Mr. Whitelegge to be *A. rugata*, A. & W., a form not recorded by Dr. Haswell as Australian. Passing to the genus *Xanthodes*, we found *X. atromanus*, Hasw., to be fairly abundant, and are thus able to localize a very interesting crab, of hitherto unknown habitat, and a species which may be a *Medœus*, but, perhaps distinct from that hitherto recorded as Australian. We found *Etisus longimanus*, a Queensland, Fiji, and Sandwich

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* Report to the Trustees (*Lord Howe Island, Report on Present Prospects, &c.*), *loc. cit.*, p. 12.

Island species, common on the reef. Other representative tropical forms are *Phymodius ungulatus*, M. Edw., and *Chlorodius niger*, Forsk., the latter being very abundant. By far the commonest Decapod at Lord Howe is *Ozius truncatus*, M. Edw., found everywhere on the rocks between tide marks. It is of a remarkably active disposition, and possesses the faculty of making its way into all sorts of crevices and corners. The largest we obtained measured two and a half inches across the carapace, by one and three-quarters. Another small species of *Ozius*, as yet unnamed, with the fingers of the hand tipped with dark red, occasionally came under notice, and is a very distinctly marked form. The Eriphidæ, besides the genus *Ozius*, are represented by a species of *Pilumnus*, apparently not recorded as Australian by Haswell, *Actumnus tomentosus*, Dana, a Queensland species, and *Trapezia cymodoce*, Herbst, a rare form.

Small individuals of *Neptunus pelagicus*, Linn., were caught, and, with *Thalamita prymna*, Herbst, represent the Portunidæ. The former is one of the edible crabs sold in the Sydney market, and a very widely-distributed species, but does not appear, so far as our observations went, to attain any size at Lord Howe Island. A second small species of *Thalamita* was collected, covered with many spines, but is at present undetermined. When visiting Blenkinthorpe Bay, Mr. Thorpe and the writer obtained numerous examples of a sand-crab, to all appearance *Ocypoda ceratophthalma*. Dr. W. A. Haswell states* that the hands are not spinous, but in our specimens they are decidedly so, and correspond more closely with the description given by Stark† than they do with that of the other writer. This crab burrows in the sand between tide-marks, to a depth of two feet or more, the burrows running obliquely in a direction from the approaching water. The apertures of these retreats are circular, and at a first glance resemble those of some mollusca.

The largest crab we met with at Lord Howe was *Grapsus variegatus*, Fabr., and it is without doubt also the commonest. It is a species found everywhere throughout the Pacific, reaching even to the coasts of Chili.‡ Another cosmopolitan member of the Grapsidæ is *Planes minutus*, Linn., and besides this we found *Paragrapsus quadridentatus*, M. Edw., and *Plagusia chabrus*, Linn. The identification of the former is open to some doubt, although the females were obtained having the characteristic line down the hand to the forefinger. The latter is another species having a very wide distribution.

The little *Leiolophus planissimus* is common under stones, exceedingly quick, and, like some spiders, has the habit, when disturbed, of crouching down with its legs tucked under it, when its almost flat carapace is difficult to detect.

By far the most important member of the Decapoda was Mr. Whitelegge's discovery of a fresh-water crab, plentifully distributed in the water-carrying gullies of the North Ridge, behind the Old Settlement, at a height of from 200 to 300 feet above high-water mark. It is a species of *Hymenicus*. After leaving Newcastle in the s.s. "Taupo," on our way to Lord Howe Island, a derelict waterman's wherry was picked up, and in the joints of the timbers and along the keel we found a small crab, probably the larval condition of *Mycteris longicarpus*, Latr., a species found in Port Jackson, and, according to Dr. Haswell, in New Caledonia also. It is frequently met with marching in large companies over sandy flats. The elegant *Ranina dentata* occurs at Lord Howe, but although at times plentiful enough, we did not succeed in taking it. A specimen was, however, obligingly presented by Mr. W. Nichols.

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[*] Cat. Austr. Stalk and Sessile-eyed Crustacea, 1882, p. 94.

[†] Elements Nat. Hist., 1828, II, p. 148.

[‡] Fish and Fisheries of New South Wales, 1883, p. 125.

The Hermit Crabs, so far as our observations went, are not plentiful. *Pagurus punctulatus*, M. Edw., was secured in a dead specimen of *Turbo imperialis;* it is a widely distributed species. A second and very pretty crab was found in a young shell of the same mollusc, the ambulatory legs cross-banded in variegated colours. Fragments of a *Palinurus* were shown to us, perhaps those of *P. ornatus*, Fabr., and we were informed that the Sydney Crawfish, *P. Huegellii*, Heller, was also indigenous to the island. Should this be so, it is possible that the well-stocked waters of Lord Howe Island would form an excellent preserving ground for this most delicious of all the Australian Crustacea.

The Crangonidæ are represented by *Alpheus Edwardsi*, Aud., one of the "Nippers." This Crustacean afforded Mr. Whitelegge much amusement when collecting, by the peculiar clicking noise made when an individual was thrust into the collecting jar, just like the sudden cracking of a bottle. So deceptive was the noise, that on several occasions the jar was examined to ascertain if it had burst, and it was some time before the obvious explanation was grasped. Dr. Coppinger, in his account of the "Alert's"* cruise, describes a similar phenomenon. Speaking of a dredge-haul in Port Curtis, he says:—"Conspicuous by their abundance amongst the contents of the dredges, and by their curious habit of making a low, snapping noise, with the large pincer-claws, were the shrimps of the genus *Alpheus*. When placed in water in a glass jar, the sound produced exactly resembles the snap which is heard when a tumbler is cracked from unequal expansion of hot water."

The only Stomapod noticed was the well-known Australian tropical reef Squilla, *Goniodactylus chiragra*, Fabr.

Not the least interesting crustacean we obtained was an Isopod, a species of the genus *Ourozeuktes*, which lives parasitically within the oral cavities of fish. We found it frequenting the Sweep, *Scorpis æquipinnis*, Rich. A small Cirripede is attached freely to a multitude of marine terrestrial objects scattered about the beach. It is probably *Lepas pectinata*, Spengler. This habit of fixing itself in small clusters to almost anything is referred to by Darwin,† who mentions, amongst other things, *Spirula*, on which we also saw it. Its geographical range is wide, extending from "the North of Ireland to off Cape Horn," and it is also common under the tropics. The equally widely distributed *Lepas anserifera*, Linn., also occurs at Lord Howe. The volcanic rocks at Ned's Beach, along the high-water mark, and possibly also those at other parts of the Island are thickly dotted over with *Tetraclita rosea*, Kraus, [=*Balanus Cumingii*, Chenu.], a barnacle common to the east coast of Australia from Moreton Bay to Twofold Bay, attached, Darwin says, to "littoral rocks and shells."

The following is a complete list of the Crustacea, so far as at present determined by Mr. Whitelegge:—

Menæthius monoceros, *Lath.*
Lophactæa granulosa, *Rüp.*
Actæa tomentosa, *M. Edw.*
Actæa rugata, A & W.
Actæa, sp.
Xanthodes atromanus, *Hasw.*
Xantho ? integer, *De Haan.*
Medæus, sp.

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* Cruise of the "Alert," 1883, p. 182.

† Mon. Sub-class Cirripedia. Lepadidæ, 1851, p. 85.

Etisus lævimanus, *Randall.*
Phymodius ungulatus, *M. Edw.*
Leptodius, sp.
Chlorodius niger, *Forsk.*
Ozius truncatus, *M. Edw.*
Ozius, sp.
Pilumnus, sp.
Actumnus tomentosus, *Dana.*
Trapezia cymodoce, *Herbst.*
Neptunus pelagicus, *Linn.*
Thalamita prymna, *Herbst.*
Thalamita, sp.
Ocypoda ceratophthalma, *Pallas.*
Grapsus variegatus, *Fabr.*
Planes minutus, *Linn.*
Paragrapsus quadridentatus, *M. Edw. ?*
Plagusia chebrus, *Linn.*
Leolophus planissimus, *Herbst.*
Hymenicus, sp.
Ranina dentata, *Latr.*
Petrolisthes, sp.
Pagurus punctulatus, *M. Edw.*
Pagurus, sp.
Calcinus elegans, *M. Edw.*
Alpheus Edwardsi, *Aud.*
Goniodactylus chiragra, *Fabr.*
Palinurus ornatus, *Fabr. ?*
Palinurus Huegellii, *Heller ?*
Ourozeuktes, sp.
Lepas anserifera, *Linn.*
Lepas pectinata, *Spengler.*
Tetraclita rosea, *Kraus.*

A glance of this list will at once indicate the tropical facies of the crustacean fauna of Lord Howe Island.

Annelida.—The state of our knowledge at the present time, even of Australian worms, quite forbids our instituting any comparison with those of extra Australian localities. The earth worms of Lord Howe, of which we obtained numerous examples, resemble in general appearance those of this continent. Several ciliated marine worms were also found under loose stones on the Coral-reef. The Hirudinea are possibly well represented, the shady dark pools of the Deep Creek being admirably suited for their propagation. Land leeches occur, one form being found at the top of Mount Gower, and another in the gardens in the lower parts of the island. Two species of *Sipunculus* were found attached to stones on the Coral-reef; but the most interesting of all are the Planarian worms, of which there are large numbers. At least five or six species were obtained, both from rotten logs, from under bark lying on the ground, and from those parts of the palm stem where protected by the leaf-sheaths. In all probability the species are quite undescribed, and as they are all two-eyed, may for the present be placed in the genus *Rhynchodemus.*

Echinodermata.—Professor Jeffery Bell,* in describing the Echinodermata collected by Dr. Coppinger during the voyage of the "Alert," in 1881–82, records four Echini, as in the collection of the Australian Museum, from Lord Howe Island, viz.:—

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* Report, &c., Voyage of H.M.S. "Alert," 1881–82, p. 171.

Echinometra lucunter, *Leske.*
Strongylocentrotus tuberculatus, *Lamk.*
Echinostrephus molare, *A. Agas.*
Breynia australasiæ, *Leach.*

In the subsequently published "Catalogue of the Echinodermata in the Australian Museum,"* Dr. E. P. Ramsay mentioned the same species, and also *Tripneustes angulosus,* Leske, as occurring there.

During our late visit we obtained the whole of these except *Echinostrephus molare,* but in addition two other forms not previously recorded.

The beautiful family of the Diadematidæ is represented by *Centrostephanus Rodgersii,* A. Agass, distinguished at once by the dark purple-claret colour of the test and spines. We met with this magnificent species in the pools and hollows of the dead coral on the large reef, and, if I mistake not, rather more plentifully in similar cavities on the basaltic ledges of the west coast, but no where is it plentiful. Speaking of those found in Port Jackson, Dr. Ramsay makes the following remarks, which are equally applicable to the specimens observed at Lord Howe Island. "These Urchins frequent the reefs and rocky shores just below low tide mark, where they obtain their food; they progress with considerable rapidity for an Urchin, when once disturbed, until they find a secure retreat in some crevice of the rocks, from whence it is difficult to remove them without destroying either the spines or test. . . . . . The peculiar pigment or dye contained in the spines and within the test itself is worthy of investigation. I know of no other species on our coast which has this peculiarity. In cleaning the tests, the fingers and nails become stained with the pigment, which is very difficult to remove." Their habitat at Lord Howe, at any rate, is between tide marks as well as below. In a paper "On the habits of some Australian Echini,"† the Rev. J. E. T. Woods refers to the restricted habitat of this species, so that its discovery at Lord Howe Island is of some importance. He remarks on the species that "it clings to the rock with its powerful suckers with the surface free. It is very careful to select as a place of repose a very narrow cell with just room enough for its body." Our observations quite bear out the fact that it does occupy most peculiar holes and crevices, but we saw it quite as frequently in open pools with plenty of room around.

The Cidaridæ are represented by a *Phyllacanthus,* perhaps *P. baculosa,* Lamk. We did not obtain this, but a much damaged example has been presented to the Museum by Mr. Campbell Stevens.

Echinometra lucunter, Leske, is by far the commonest Urchin, as it appears to be also on some parts of the Australian coast. It was invariably met with in holes just large enough for its reception on the flat table surface of the Coral-reef, when it became an exceedingly difficult matter to effect the extraction of individuals. Of one thing I am quite satisfied, some do not leave their cells but continue to enlarge them as their growth progresses. This is obvious from the overhanging upper edges of their domiciles, rendering the opening in some degree smaller than the Urchin's test, and to effect the extraction of such, a hammer was requisitioned. This habit of frequenting restricted spaces may, perhaps, to some extent, explain the absence of suckers around the actinosome, which, according to the Rev. J. E. T. Woods, are wanting in this species.* As it is the commonest, so it is the most variable Urchin in the colour of its spines. We observed examples with light drab spines; others with those organs of a greenish-yellow, tipped with a lighter shade; and lastly, a less common variety, in which the whole of the spine is dark-brown, and the lips a yellowish-grey, forming a very strong contrast, but there are even gradations to be traced in these varieties. Another remarkable feature, and one not referred to by Alexander Agassiz in his "Revision" and the generality of writers, is the want of symmetry in the test of a larger number of examples. Some certainly appear to be more or less circular, but in by far the larger number, the test is laterally compressed, assuming a more or less oblong outline. This is even very apparent in non-denuded examples.

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* Catalogue Echmodermata, Australian Museum. Part 1. Echini. 1885, p. 45.
† Proc. Linn. Soc., N. S. Wales, v, pt. 2, p. 196.

Another member of the Echinometridæ found at Lord Howe Island, where it is common, is *Strongylocentrotus tuberculatus*, Lamk. It is a large olive-spined form, not then known from the mainland according to Dr. Ramsay,† but almost peculiar to the island.‡ We obtained a few moderately large examples, and many young individuals. With the exception of the succeeding species it is the largest Urchin found at Lord Howe. The Rev. J. E. T. Woods quotes§ this species as found generally in "N. E. tropical Australia," and he mentions also one example from Port Stephens and another from New Zealand.

The edible Urchin *Tripneustes angulosus*, Leske, grows to large proportions in the genial waters of the Lagoon at the island, the sandy beach within the harbour being an excellent locality for obtaining examples cast up alive from deeper water. We obtained several large specimens.

Breynia australasiæ, Leach, occurs in great abundance in the sandy bottom of the Lagoon, at some little distance below low-water mark, and of large size, some of our own examples measuring four and a half inches by four, and some nearly five from before backwards. It varies from a deep cholocate to a dark fuscous-brown and burrows in the sand, sometimes to a depth of six inches. Although authorities differ as to its geographical distribution little doubt can exist that Lord Howe Island is its principal habitat. Dr. Ramsay says "it has been seldom found in Port Jackson or on the adjacent coast," whilst Mr. Tenison Woods remarks "found from Cape York to Port Jackson." Very fresh specimens must be obtained if it is desired to examine the soft parts, for they decompose with great rapidity, leaving the shells more or less filled with foraminifera on which they appear in a great measure to live.

Lastly Messrs. Whitelegge and Thorpe obtained five examples of a very pretty little *Echinoneus* on the flat reef running out from the south side of Ned's Beach. The specimens are of a dark chocolate-brown colour, completely covered with a fur of delicate, short spines, and were found under stones. The smallest was somewhat over half an inch in its longest diameter, whilst the largest was quite one and a half inches. The species has been determined by Dr. Ramsay to be *E. cyclostomus*, Leske.

The Asteroidea collected are not numerous, four genera and species comprising the series. *Asterias calamaria*, Gray, is exceedingly common on the

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* Proc. Linn. Soc., N. S. Wales, v, pt. 2, p. 197.

† Cat. Echinodermata, Australian Museum. Part I. Echini. 1885, p. 46.

‡ It has lately been found at Shark Point, Port Jackson, by a Mr. Hunt.

§ The Echini of Australia, Proc. Linn. Soc., N. S. Wales, II, pt. 2, p. 158.

Coral-reef; scarcely a stone of any size can be overturned but what examples of this species are to be seen clinging to it. *Asterina exigua*, Lamk., a disc-like form, is almost as frequent as the last species, and so much resembles the colour of the rocks to which it adheres, that it is at times distinguished with difficulty. *Ophidiaster Germani*, Per., is sparingly met with, of a dull red colour, and with long finger-like arms. It is very similar, except in colour, to a blue species met with in Torres Straits. We also found a fourth small species, *Patiria crassa*, Gray, somewhat solariform, with six or seven rays, and grey in colour. Both in the Australian Asteroidea, and the succeeding group of the Ophiuroidea, much yet remains to be done; in fact, they may be practically said to be unworked groups. We obtained *Ophiocoma breviceps*, Peters, and *O. crenacea*, M. and T. We have reason to believe that many fine *Holothurians* will be met with in the future over this prolific hunting ground, although we only succeeded in capturing four species, chiefly under stones and in the pools of the Coral-reef. The smallest and commonest of the four, a *Holothuria*, of a brownish colour, emits, when touched, a white, sticky, fibrous discharge, which congeals like india-rubber. This is probably allied to the "milk-fish" described by the Rev. J. E. T. Woods*, from the reefs of the south-east coast of Australia. He says, "Another species is the "milk-fish," or "cotton-fish," so called from its power of emitting a white viscid fluid from its skin, which clings to an object like shreds of cotton." Another species is a large form, a foot in length, perhaps *Holothuria vagabunda*, Seleneka, of a black-brown colour; a third and rather common Holothurid, brown, mottled with white, we believe to be *Stichopus chloronotus*, Brandt, and obtained by the "Challenger" expedition in the Fiji Islands. The last is a *Cucumaria* of a pale straw yellow.

Actinozoa.—We experienced great disappointment in our efforts to obtain a representative series of the corals forming the fringing reef at Lord Howe. The long continued foul weather quite prevented our visiting those portions of the reef best adapted for the study of its actinology. Quantities of dead fragments are scattered about the sandy beach of the Lagoon, but usually in such a comminuted, or rolled condition, as to be quite useless for identification. In this manner we obtained convoluted masses of a *Turbinaria*; finger-like colonies of a *Stylophora*, very like *S. cellulosa*; globose masses of *Cyphastrea Bruggemanii*, Quelch; and flabellate expansions of a *Madrepora*. In the pools of the shore ends of the reef *Cœloria dadælia*, E. & S., or at any rate a coral we believe to be this species occurs plentifully, forming irregular rounded masses from a few inches upwards to specimens of large size. Accompanying these are short small colonies of a *Tubipora* of very curious structure, and so far undetermined by us. The upper portions of each corallite, above the terminal platform or external tabulum, is uncalcified, and remains membranaceous, and soft. Alcyonarians are plentiful. We recognized small creeping clusters of a *Zoanthus*, of a greyish purple; flattened disk like expansions referable to *Polythoa*; *Ammothea thrysoides*, H. & Ehr., in arborescent finger—like tufts, and a number more at present undetermined. An *Alcyonium* must however be mentioned, forming flat irregular table-like masses with small convolutions, and an *Anicella* not unlike *A. australis*, Gray, previously found at Port Essington, by the late Professor J. B. Jukes, when acting as naturalist to H.M.S. "Fly." Sea-anemones are very plentiful on all rocky ground between tide marks. We observed three varieties—the dark carmine-red, green, and a small brown form. It would have taken up far too much of our time to have attempted to kill these when expanded, without which spirit specimens are of very little value.

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* Proc. Linn Soc., N. S. Wales, v, pt. 2, p. 128.

The Fringing reef itself forms " a simple broad platform, as an extension apparently of the dry land," at both its northern and southern ends where it impinges on the shore at North Bay, and under Mount Ledgbird respectively. There are no less than five channels communicating between the Lagoon and the open sea. Two of these channels are navigable, the northernmost giving five fathoms, and that at the south end seven fathoms. Inside the Lagoon the depth varies from a sixth up to two and a quarter fathoms; but there are here and there holes, yielding much deeper water. Immediately outside the sea face, the depth varies from one and three quarters fathoms to five fathoms, rapidly descending to fifteen, twenty, and twenty-five fathoms within a comparatively short distance of the reef. The latter at its greatest distance from the shore is about two-thirds of a mile. The seaward edge is but little broken up; but the Lagoon margin is much more sinuous. The reef varies in width from less than a cable up to four and six cables. The longest section between any two channels penetrating it is over a mile in length. The beach immediately contiguous to the shore ends of the reef is composed of large coral blocks intermingled with others of basalt, and piled up into a regular terrace, extending to a height of from fifteen to twenty feet above high-water mark. This terrace graduates outwards from the shore forming the central ridge of the reef built up of dead coral blocks, and is always bare at from half to three-quarter ebb. Around this central portion is a lower shelf or platform, composed chiefly of dead coral *in situ*, and always more or less a-wash at low tide. Its surface is furrowed with narrow water channels and excavated into deep pools containing great abundance of life, and many fine living examples of *Cœlaria dadælia*, E. & S. ?, and *Tubipora*. The blocks generally are profusely covered with Nullipores. The appearance of the inner portions of the Lord Howe Island reef corresponds well with Dana's description of the shore platforms of some of the Paumotus Islands. He says, "Much of it is commonly bare at low tide; there are places where it is always covered with a few inches or a foot of water; and the elevated edge, the only part exposed, often seems like an embankment preventing the water from running off."*

The seas which break over the Lord Howe reef during gales from the westward are very heavy, and simply as a display of nature, remarkably grand. The destruction, however, caused by them does not seem to be particularly heavy, which is perhaps accounted for by the very gradual increase in the soundings outside. The two southernmost channels through the reef are opposite the mouths of partially dry freshwater creeks. Doubtless at times a good deal of floodwater traverses these, but it can hardly be of sufficient continuance or volume to gradually influence these openings. In some well-known fringing reefs the channels are opposite main valleys, and it is supposed that the growth of the coral polyp is influenced by the sediment discharged from them. This can scarcely be so at Lord Howe for the reason given above, the discharge from these creeks being more of the nature of torrent freshets than continuous streams constantly conveying the products of slow denudation to interfere with the healthy existence of the coral polypes.

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* Corals and Coral Islands, 1872 (Engl. Edit.) p. 176.

The width of the Lord Howe fringing reef is very variable, and in consequence its distance from the shore equally so. It is however, from one to three-quarters of a mile, but as the bottom of the Lagoon shoals very gradually this is perhaps to be accounted for. The depth of the channels passing through the reef differs much. The main north-west entrance varies from a little less than four to six fathoms. The south entrance immediately in the gut-way has six and seven fathoms of water, outside increasing to nine, whilst just inside the Lagoon it shoals to two and a quarter fathoms.

The Lagoon wherever examined by us showed a sandy bottom, except off the "Old Settlement," where it becomes rather more argillaceous. We anticipated finding it teeming with life, but it proved very barren, and comparatively destitute of isolated coral growth. The coral life of Lord Howe Island was one of the points to which we were least able to pay satisfactory attention, and will afford a wide field of inquiry for future researches.

Hydrozoa.—Like the Actinozoa this group required a much larger amount of time than we were able to afford for its study. The specimens obtained were chiefly collected from weed thrown up on the sandy beach of the Lagoon. One very important discovery, however, was made by Mr. Whitelegge, namely, *Ceretella fusca*, Gray, with the polypes protruded, and which by very careful manipulation he was able to kill in that condition. I believe I am correct in stating that the zoöids of this hydrozoon have not before been observed.

The *Siphonophora* are very plentifully represented by *Physalia* and *Velella*. At certain times the Lagoon beach is simply covered by myriads of the *Physalia megalista*, Brandt; but what is very singular, on those days on which the *Velella* is washed ashore in equal quantities, *Physalia* is entirely absent. The stinging properties of *P. megalista* are very powerful. Not only is intense inconvenience caused to the part brought in contact wth the animal—say, for instance, the hand—but the irritation so caused can be conveyed from that member to any other part of the person touched, such as the face. Although losing the beautiful dark purple-ultramarine blue when placed in spirit, the bladder retains this tint for a considerable time, in more or less perfection, when left lying on the sandy beach.

The remaining Hydroids collected, as determined by Mr. Whitelegge, are:—

Ceratella fusca, *Gray?*
Sertularella solidula, *Bale.*
Eucopella campanula, *Lendfel.*
Sertularia minima, *D'A. W. Thompson.*
Halicornaria, sp. nov.?
Halicornaria, sp. nov.?
Plumularia, sp. nov.?
Plumularia spinosa, *Bale.*
Campanularia tincta, *Hincks.*

Porifera.—Of large sponges but few were obtained, and these wholly as dead specimens. The blocks and stones about the reef foster several forms of small incrusting sponge which would probably repay study.

The determinations so far, made by Mr. T. Whitelegge, are as follows:—

Ianthella flabelliformis, *Gray.*
Cacospongia, sp.
Euspongia officinalis, *Linn.*, vars.

The purple-blue fan-shaped growths of *Ianthella* probably grow to a considerable size at Lord Howe. Several varieties of the sponge of commerce occur, and are used by the Islanders. They are, however, small. The tufts of *Cacospongia* are the most numerously represented.

Protozoa.—We found that the beach sand, besides comminuted coral, and some shell detritus, is to some extent composed of *Orbitolites complanatus*, Lamk., and either *Tinoporus* or *Calcarina.* The latter is that peculiar radiated, tuber-like Foraminifer discovered by the late Prof. J. B. Jukes, in Torres' Straits.

R. ETHERIDGE, Junr.

No. 2.

NOTES ON THE OOLOGY OF LORD HOWE ISLAND.

BY

A. J. NORTH.

NOTES ON THE OOLOGY OF LORD HOWE ISLAND.

Our knowledge of the nesting and eggs of the Lord Howe Island birds is very limited, and until an excursion, fitted out by the Trustees of the Australian Museum, in September, 1887, very little had been done towards recording authentic information relative to the breeding season, or the eggs of the birds found there. Of the sixty species recorded in Dr. Ramsay's "List of birds found in Lord Howe Island," only eleven are strictly peculiar, and of only one of these is the nest and eggs known; much remains therefore to be done, and it is to be hoped that any one favourably situated for acquiring further information, will not fail to make notes on this interesting subject.

Halcyon vagans, *Lesson.*

Mr. E. H. Saunders, who has lately returned from Lord Howe Island, states that he found this bird breeding freely during the month of November, 1887, in the hollow limbs of trees. The eggs, five in number, for a sitting, are rounded in form, and of a beautiful pearly-white tint. The dimensions of a set are as follows:—Length, (A) 1·14 x 0·92 inch (this specimen is somewhat sharply pointed at one and; (B) 1·08 x 0·91 inch; (C) 1·12 x 0·91 inch; (D) 1·1 x 0·9 inch; (E) 1·08 x 0·92 inch.

Aplonis fuscus, *Gould.*

According to Mr. Saunders, the nidification of this bird is entirely different from that of the allied genus *Calornis*, of the Australian continent, resorting to the hollow branches of trees to construct their nests; several were found with young birds, but only one containing eggs. In every instance these nests were built of dried grasses, and placed in a hollow at the end of a branch. Eggs, four in number, for a sitting, varying somewhat in form even in the same set; two eggs of this set are swollen ovals, being thickest at the centre, and slightly pointed towards each end, the other two are long ovals, slightly tapering at one end only; in colour they are of a pale bluish green, freckled with markings of a reddish and wood-brown tint, equally disposed over the surface of the shell, some of the markings are very indistinct. Length, (A) 1·97 x 0·78 inch; (B) 1·06 x 0·77 inch (thick ovals; (C) 1·14 x 0·76 inch; (D) 1·12 x 0·75 inch.

Chalcophaps chrysochlora, *Wagler.*

The nest of this bird is composed of a few thin twigs placed crosswise on the horizontal branch of a tree, not far from the ground. The eggs are two in number, oval in form, of a light creamy-white colour, and give the average measurement of of 1·47 inch x 0·8 inch.

This bird, previously plentiful upon the island, has already become very scarce and will probably soon be exterminated with other species by the Islanders.

Sterna fuliginosa, *Gmelin.*

This bird was found breeding on the rocky ledges and flat parts of the cliffs, but more often on the bare sand; little or no attempt was made at forming a nest, except in a few instances where a little debris was found scraped around the single egg laid by this bird for sitting. Mr. Saunders, who visited the island during the breeding season, collected a large number of the eggs during November. In a series of over one hundred eggs examined, there is a great variation in the size, colour, and disposition of their markings. The predominant form is oval, tapering slightly towards the thin end, the colour a dull white, some being nearly devoid of markings, others uniformly freckled and spotted over the whole surface of the shell with reddish-brown markings, others have large irregularly-shaped confluent blotches of purplish-red and slaty-grey, the latter appearing as if beneath the shell, these markings predominating in some towards the larger end of the egg, and a number have rounded spots of rich-red evenly distributed over the surface of the shell. In comparatively few instances do the markings assume the form of a zone.

Length, (A) 2·13 inches x 1·42 inch.
(B) 2 ,, x 1·45 ,,
(C) 1·85 ,, x 1·4 ,,
(D) 2·15 ,, x 1·45 ,,
(E) 2·11 ,, x 1·4 ,,
(F) 2·04 ,, x 1·34 ,,
(G) 2·02 ,, x 1·47 ,,
(H) 2·14 ,, x 1·48 ,,

Anous stolidus, *Linnæus.*

This bird was found breeding during October and November. Its single egg is deposited on a nearly flat nest of sticks, twigs, and seaweed, placed upon low bushes. The eggs, usually oval in form, are slightly pointed at one end, and vary in colour from white to creamy-white, some being minutely spotted all over with brownish-black, others being largely blotched, more particularly towards the larger end, with blood-red markings, and nearly obsolete spots of the same colour appearing as if beneath the surface of the shell. Two average specimens measure as follows :—Length, (A) 2·03 inches x 1·45 inch ; (B) 2·18 inches x 1·47 inch.

Anous cinereus, *Gould.*

This species was found breeding in the early part of September, also during the month of November. The eggs were rather difficult to obtain. For the purposes of breeding this bird usually resorts to almost inaccessible ledges of rocks, but sometimes deposits a single egg on the bare sand. In form the eggs are nearly true ovals, being but slightly tapered at one end, of a dull creamy white ground some colour, being sparingly freckled and spotted with faint reddish-brown and slaty-grey markings, the latter colour predominating in some instances, and appearing as if beneath the surface of the shell; others have short, thick, wavy markings, resembling ill-shapen letters and figures, equally distributed over the surface of the shell, which although not thickly disposed, yet, are in some places confluent, and more indistinct than usually found on other Terns eggs. There is very little variation in their size and shape, two average specimens measure as follows :—Length, (A) 1·63 x 1·16 inch ; (B) 1·67 x 1·2 inch.

Puffinus sphenurus, *Gould.*

During the months of November and December, this bird was found breeding in great numbers, and like most of the *Procellariidæ*, they dig a long tunnel or burrow in the sand or the soft earth, many of these burrows are several feet in length, and a single egg is deposited at the extremity, which when fresh, is snow-white, but soon becomes stained and soiled. There is great variation in the shape and size, true ovals, lengthened and swollen ovals predominating, some terminating abruptly at one end, others being sharply pointed.

Length, (A) 2·35 inches x 1·67 inch.
(B) 2·45 ,, x 1·6 ,,
(C) 2·45 ,, x 1·68 ,,
(D) 2·57 ,, x 1·64 ,,

Nectris brevicaudus, *Brandt.*

This bird was likewise found breeding in great numbers, during the months of November and December. The mode of nidification is so precisely similar to that of the preceding species, that a separate description is not necessary. Like all Petrel's eggs they have a peculiar musky odour, which they always retain, even when emptied of their contents and kept for many years. Only one egg is laid for a sitting. Six specimens measure as follows :—

(A) 2·63 inches x 1·78 inch.
(B) 2·8 ,, x 1·73 ,,
(C) 2·78 ,, x 1·8 ,,
(D) 2·65 ,, x 1·81 ,,
(E) 2·82 ,, x 1·72 ,,
(F) 2·87 ,, x 1·81 ,,

Phaeton rubricauda, *Bodd.*

This bird is found breeding during November and December, its single egg is laid under the shelter of projecting ledges, of almost inaccessible rocks, on the face of cliffs, and are consequently very difficult to procure. The eggs are oval in form, being thickest at the centre, and tapering slightly at one end, of a dull reddish-brown colour, which is nearly obscured by minute freckles and spots of purplish-brown and grey, in some instances they are blotched and smeared, not unfrequently on the smaller end. Two specimens obtained are nearly white, and entirely devoid of markings.

Length, (A) 2·6 inches x 1·85 inch.
(B) 2·65 ,, x 1·9 ,,
(C) 2·78 ,, x 1·95 ,,

SULA CYANOPS, *Sundevall.*

The Masked Gannet was found breeding from September to December; little or no attempt is made at forming a nest, the eggs, two in number, usually being deposited on the bare ground, when nearly laid, they are of a pale greenish-white colour, which in most instances is covered with a thick coating of lime; after being sat upon for a few days, the eggs become soiled and assume a dirty brown hue. In form they vary from short to long ovals.

Length, (A) 2·47 inches x 1·84 inch.
(B) 2·62 „ x 1·78 „
(C) 2·47 „ x 1·9 „
(D) 3·65 „ x 1·81 „
(E) 2·6 „ x 1·87 „
(F) 2·57 „ x 1·9 „

A. J. NORTH.

No. 3.

THE REPTILES AND FISHES OF LORD HOWE ISLAND.

BY

J. DOUGLAS OGILBY.

Assistant in Zoology, Australian Museum.

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THE REPTILES AND FISHES OF LORD HOWE ISLAND.

REPTILES.

If we exclude the Green Turtle, which has not been found since 1789, the recent Reptiles recorded from Lord Howe Island are but three in number, and all belong to the Lacertilian group: of two of these the Museum now possesses excellent series. So far as I know none of them have as yet been obtained in New Zealand*, and only the first of them has been recorded with any degree of certainty from Australia, this example, which is in the British Museum, having been obtained at Champion Bay, N. W. Australia, but not recorded from any intermediate locality; it is also found on Phillip Island, an outlying rock off Norfolk Island, on which latter strange to say no reptiles whatever occur. The second has a very wide range through Polynesia and New Guinea to the Moluccas, and has been doubtfully recorded from Port Essington, while the third species seems to be peculiar to the island.

GECKONIDÆ.

PHYLLODACTYLUS, *Gray.*

PHYLLODACTYLUS GUENTHERI, *Blg.*

There is now in the Museum a fine series of this Gecko in all stages of growth. The members of the various expeditions agree in stating that it is much more abundant in the vicinity of the coast than on the more elevated districts inland.

GEHYRA, *Gray.*

GEHYRA OCEANICA, *Less., sp.*

The British Museum contains a specimen collected on the island by the late Mr. J. Macgillivray.

SCINCIDÆ.

LYGOSOMA, *Gray.*

LYGOSOMA LICHENIGERUM, *O'Shgn., sp.*

The remarks under the first species apply equally to this Lizard.

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* There is no record, so far as I am aware, of the occurrence of *Gehyra oceanica* in New Zealand, though from its wide Polynesian range it seems strange that it is not found at least in the northern district of the North Island.

FISHES.

THE present catalogue of the Fishes of Lord Howe Island is as complete as the means at my disposal allow, having been compiled from the following sources :—(i) The British Museum Catalogue of Fishes, 1859–70, by Dr. Albert Günther, who however appears to have been acquainted with a single species only, and that of very doubtful authenticity ; (ii) specimens collected by Captain Armstrong, late Resident Magistrate of the island, and forwarded by him to the Museum ; (iii) a collection made by Mr. A. Morton ; (iv) a fish presented to the Hon. Wm. Macleay by the late Mr. H. T. Wilkinson, at that time the Visiting Magistrate, and which is undoubtedly the most interesting of the entire collection, as proving the existence of the genus *Tetragonurus* in the southern hemisphere, while the species itself is absolutely identical with Lowe's Atlantic species*; (v) Fishes presented to the Museum from time to time by Mr. Langley ; (vi) specimens in the Macleay Collection at Elizabeth Bay, and kindly placed at my disposal by the owner ; (vii) the collection formed by Messrs. R. Etheridge, jun., T. Whitelegge, and J. Thorpe ; and (viii) the specimens obtained by Mr. E. H. Saunders. The two latter collections, the first of which was specially organized and equipped by the Australian Museum, yielded by far the most important results, and added greatly to our knowledge of the Biology and Palæontology of this interesting oceanic islet.

It is unfortunately out of my power to give any definite account of the Palæichthyan fishes of the island, but from information elicited from Messrs. Etheridge, Langley, and Saunders, I am convinced that *Galeocerdo rayneri*, and *Carcharodon rondeletii* will prove to be the most abundant of the large sharks.

The number of species included in the present list is eighty-eight, five of which, a *Petroscirtes*, a *Lotella*, a *Pseudoscarus*, a *Balistes*, and a *Gobioides*, are irrecognizable owing to the bad condition in which they now are. Of the remaining eighty-three species fourteen are described as new, one of which belongs to a new genus of deep-sea fishes (*Sternoptychidæ*) ; these are as follows :—*Apogon chrysurus*, *Chætodon aphrodite*, *Haplodactylus etheridgii*, *Cirrhitichthys splendens*, *Pempheris unwini*, *Gobius æolosoma*, *Pomacentrus fasciolatus*, *Glyphidodon polyacanthus*, *Anampses elegans*, *A. variolatus*, *Solea ramsaii Sternoptychides dentata*, *Monacanthus howensis*, and *Tetrodon callisternus;* while of the sixty-nine species then left, no less than twenty-one are here recorded for the first time from Australian waters. These are as follows :—*Anthias cichlops*, *Scorpæna cooki*, *Plesiops nigricans*, *Salarias variolosus*, *S. marmoratus*, *S. quadricornis*, *Acanthoclinus littoreus*, *Cossyphus atrolumbus*, *Labroides paradiseus*, *Anampses twisti*, *Stethojulis axillaris*, *Platyglossus pseudominiatus*, *P. trimaculatus*, *Julis lunaris*, *J. trilobata*, *Saurus varius*, *Exocœtus dovi*, *Sprattelloides gracilis*, *Congromuræna mellissi*, *Ostracion fornasini*, and *Tetrodon valentini*. Of the remaining forty-eight species, one of which, *Serranus ouatalibi*, has a very doubtful record, thirteen only have been recorded from New Zealand, of which number eleven are also known from the Australian coast ; it therefore follows that so far as the fishes are concerned the fauna is strictly Australian, only two species, *Acanthoclinus littoreus* and *Ostracion fornasini*, having been recorded from New Zealand, and not from Australian seas, while the former was, previous to this record, a purely New Zealand family,* and the latter is sure to turn up sooner or later on our north-eastern seaboard. Five species—*Plectropoma cinctum*, *Trachypoma macracanthus*, *Apogon norfolcensis*, *Platystethus cultratum*, and *Parma polylepis*—are peculiar to Lord Howe and Norfolk Islands.

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* See the paper "On the genus *Tetragonurus*," by Dr. Ramsay and the author, published in the Proc. Linn. Soc. N. S. Wales, III (2), 1888, p. 9.

ACANTHOPTERYGII.

PERCIDÆ.

ANTHIAS, *Bloch.*

ANTHIAS CICHLOPS, *Blk.*, *sp.*

A single example, so far as I am aware the second which has fallen into the hands of any naturalist, was picked up dead, but in a fresh and perfect state, on the beach by Mr. E. H. Saunders during last April; its length is three and four-fifths inches.

SERRANUS, *Cuvier.*

SERRANUS OUATALIBI, *Cuv. & Val.*

This species is mentioned here on the authority of Dr. Günther (Catal. i. p. 120), but the occurrence in Australian waters of a West Indian fish belonging to this genus is so improbable that I am inclined to believe either that the specimen will eventually turn out to belong to a different species—the fin rays are noticed by Dr. Günther as slightly differing from the normal number—or that the example may by some chance have been erroneously labelled.

SERRANUS FUSCOGUTTATUS, *Rüpp.*

A single young example under seven inches in length.

SERRANUS DÆMELI, *Gnth.*

The "Black Rock Cod" of the islanders. It is plentiful and grows to a large size; one which Mr. Saunders collected weighed seventy-five pounds, and measured forty-two inches, while Captain Langley brought a rather dilapidated skin measuring no less than fifty-four inches, and it is said to attain to even greater dimensions. As it is caught solely by hook and line, it may be imagined that tackle of great strength is required, since, in addition to its weight, it fights with great determination in its efforts to escape. Small examples up to ten pounds in weight are excellent for the table; and with reference to the Sydney market, where however it is scarce and of small size, not more than half a dozen species excel it. At the Solitaries, a group of islets about two hundred miles north of Sydney, it is said to reach the weight of one hundred pounds.

PLECTROPOMA, *Cuvier.*

PLECTROPOMA CINCTUM, *Gnth.*

The "Striped Rock Cod" is common both in rock pools and in the open sea; it grows to at least eighteen inches in length, and both it and the succeeding species are used as food.

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* Since writing this sentence I find that Mr. Francis Day has described a species from Madras (Proc. Zool. Soc. 1888, p. 264).

TRACHYPOMA, *Günther.*

TRACHYPOMA MACRACANTHUS, *Gnth.*

The "Red Rock Cod"* of the islanders is also common, and grows to about ten inches in length. It is usually taken by hook off the rocks, but Mr. Saunders' examples were obtained under stones between tide-marks, a rather anomalous position for a Serranoid fish.

ARRIPIS, *Jenyns.*

ARRIPIS SALAR, *Rich.*

The "Salmon" is abundant, and going as it does in large schools along the shore is easily caught in great numbers. It is considered one of the best fishes† for the table, whether fresh or smoked, and attains to a length of over three feet.

APOGON, *Lacépède.*

APOGON NORFOLCENSIS, *Ogilby.*‡

The "Big-eye" is abundant, and grows to the length of six inches.

APOGON CHRYSURUS, *sp. nov.*

B. vii. D. 7. 1/9. A. 2/8. V. 1/5. P. 15. C. 17. L.l. 25. L. tr. 2/6.

The length of the head is one-third, the height of the body three-tenths of the total length; the diameter of the eye is from three to three and one-fifth in the length of the head; the snout is obtuse, from two-thirds to three-fifths of the diameter of the eye, while the interorbital space is flat, three-fourths of the same, and, along with the snout, divided by broad ridges into four deep poriferous areas. The upper surface of the head is flat. The lower jaw protrudes slightly beyond the upper, and the maxilla, which is provided with a strong median ridge reaching to the truncate posterior margin, extends to the vertical from the posterior fourth of the orbit. The opercle is armed with a short flat inconspicuous spine; the outer limb of the preopercle is very finely serrated on the vertical edge and rounded angle, the horizontal edge and the inner limb being entire; the post-temporal is denticulated in some specimens, but smooth in others. *Teeth.*—The jaws, vomer, and palatines are armed with bands of villiform teeth. *Fins.*—The dorsal spines are strong, the third the strongest and highest, five-sevenths of the length of the head; the origin of the second dorsal is above the ninth scale of the lateral line, and is situated midway between the tip of the snout and the extremity of the caudal fin; its spine is strong, one-half of the length of the head, and the anterior rays are about one-third longer than the spine: the anal commences beneath the anterior ray of the soft dorsal, and ends a little behind that fin; its second spine is strong and compressed, three-sevenths of the length of the head; the rays are similar to those of the dorsal, and the last is divided from the very base: the ventral fin is rounded, two-thirds of the length of the head, and not reaching beyond the origin of the anal fin; its spine is strong and compressed, sub-equal in length to that of the second dorsal: the pectoral fin is rounded, from two-thirds to four-sevenths of the length of the head: the caudal fin is slightly rounded, from four and three-fifths to four and four-fifths in the total length. The *scales* are large, ctenoid, and firmly adherent; there are two scales between the occiput and the origin of the first dorsal fin, and ten on the ridge of the tail behind the second dorsal. The *lateral line* is strongly curved to opposite the termination of the soft dorsal, and the tubes are simple throughout its entire length; the elongate scale on the caudal fin bears three or four large open pores on either edge. *Colors.*—Head and body uniform yellowish-brown without ornamentation, excepting an iridescent spot on the opercle; the dorsal, anal, and ventral fins are of a darker shade, and the upper third of the spinous dorsal is jet black, while the basal third of the anal, the pectoral and the caudal fins are brilliant orange.

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* The colonists of Lord Howe Island evidently show a more critical appreciation of the affinities of species than do the fishermen of New South Wales, among whom the name of "Red Rock Cod" is impartially given to *Scorpæna cruenta* and *S. cardinalis.*

† In Sydney this fish is not considered fit to send to table. It is in my opinion coarse, dry, and tasteless, and as it decays very rapidly great care should be taken in choosing only the freshest specimens, especially during the summer.

‡ Described in the Proc. Linn. Soc. N. S. Wales, II (2), 1887, p. 99.

Mr. Saunders, who collected three specimens of the length of from three and two-thirds to three and four-fifths inches, informs me that they are rare, and are quite unknown to the islanders, who are well acquainted with the preceding species. His examples were taken from a pool between tide-marks. Register numbers, I. 1799–1801.

CHÆTODONTIDÆ.*

CHÆTODON, *Cuvier.*

CHÆTODON STRIGATUS, *Cuv. & Val.*

Very common, growing to six inches in length, but not used as food.†

CHÆTODON APHRODITE, *sp. nov.*

Plate III, f. 2.

B. vi. D. 12/26. A. 3/21. V. 1/5. P. 15. C. 17. L.l. 39/12. L. tr. 8/18.

The length of the head is three and one-fourth in the total length, the height of the body, which is strongly compressed and very high, five-ninths of the same measured above the vent. The eye is large, situated close to the upper profile of the head, in the length of which its diameter is contained two and three-fourths times; the snout is but little produced, not being as long as the diameter of the eye, and the slightly convex interorbital space is even less than the snout. The upper profile descends abruptly from a short distance in front of the dorsal to the snout, which is concave; the ventral profile, though considerably rounded, is not nearly so much so as that of the dorsal. The preopercle is entire. *Teeth.*—Brush like. *Fins.*—The dorsal spines are moderately strong, the fifth the longest, three-fourths of the length of the head, and longer than the rays; the soft portions of both this and the anal fins are rounded posteriorly: the anal spines are stronger than those of the dorsal, the second and third equal in length, and five-ninths of the length of the head: the ventral fin reaches to the third anal spine, and the pectoral somewhat further, the latter measuring one-fourth of the total length, while the truncate caudal only measures five and two-thirds in the same. The *scales* are of moderate size and ctenoid. The *lateral line* ceases opposite the twenty-fourth dorsal ray, there being thirty-nine tubular scales up to that point. *Colors.*—The upper surface of the snout and the interorbital space yellow, the extreme tip of the snout and chin black, the preorbitals and mandibular region whitish; the ocular band is narrower than the eye, and runs obliquely forward from the hinder margin of the occiput to the eye, beneath which it curves backward in a lesser degree to the isthmus, but does not join the corresponding band on the opposite side; behind this there is a broad grey band, tipped with orange on both profiles, running from between the origin of the ocular band and the second dorsal spine downwards in front of and across the base of the pectoral to that of the ventral fin; the rest of the body, as far as the anterior dorsal and anal rays, dark purplish-brown, the fins only being tipped with orange; behind this there is a narrow golden band which is lost at the base of the anal; a large oval black spot between the sixth and sixteenth dorsal rays, below which is a brown band which suffuses itself over the entire base of the anal fin; the remainder of the dorsal and anal fins golden with a narrow black margin; the pedicle is golden, while the caudal fin is uniform grey, with a narrow dark brown basal band.

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* I can see no reason why the ordinary rule, which provides that the name of a family shall invariably terminate in "*idæ*," should be ignored in the present case, and I have therefore adopted Richardson's name; that he included species belonging to a totally different family in his *Chætodontidæ* is no argument against the use of the name, and even if it were a similar objection might be made to the use of Cuvier's *Squamipinnes*.

† *C. strigatus* is sometimes offered in considerable numbers in the Sydney market, and I have on several occasions used them for the table and found them delicious eating.

Mr. Saunders collected but one specimen of this beautiful little fish, and saw two others only. Our example measures just one inch and four-fifths, both the others having been larger. He states that they are very quick in their movements, and easily baffled him in his attempts to capture them. He found them in pools at very low water. Register number, I. 1791.

SCORPIS, *Cuv. & Val.*

Scorpis æquipinnis, *Rich.*

Two fine examples, the larger eleven inches in length, were brought back by Mr. Etheridge's party.

ATYPICHTHYS, *Günther.*

Atypichthys strigatus, *Gnth.*

The "Leather Jacket" of the islanders. It is not used as food, though it grows to a length of ten inches,—almost double that of the largest of the many scores which I have seen from the neighborhood of Port Jackson,—and is common, especially so in a deep hole inside the reef known as the "Comet's Hole."

MULLIDÆ.

HYPENEUS, *Cuv. & Val.*

Hypeneus signatus, *Gnth.*

Three specimens of this handsome Red Mullet have been brought back by our collectors, who state that it is considered rare. They are all of large size, measuring from eight and a half to ten inches in length, a size which is much greater than any I have seen from Port Jackson. As food they are soft, watery, and flavorless.

SPARIDÆ.

GIRELLA, *Gray.*

Girella cyanea, *Macleay.*

The "Blue-fish" is abundant at all seasons, and is one of the staple articles of food among the inhabitants, being used either fresh, salted, or smoked. It is taken principally if not altogether by means of hand-lines, and grows to about thirty inches in length. Its flesh is better flavored than that of the other species of *Girella*, which is probably owing to the fact that it habitually feeds on such substances as soft molluscs, crustaceans, and small fishes, instead of confining itself to a purely vegetable diet like its congeners.

HAPLODACTYLUS, *Cuv. & Val.*

HAPLODACTYLUS ETHERIDGII, *sp. nov.*

B. vi. D. 16/21-22. A. 3/6. V. 1/5. P. 9/vi. C. 15. L.l. 96-102. L. tr. 13/30.

The length of the head is five and a fourth, the height of the body four and three-fourths in the total length. The eye is situated in the upper third of the head, and encroaches slightly on the dorsal profile; its diameter is one-fourth of the length of the head, and two-thirds of that of the snout; the interorbital space is slightly concave, and a trifle more than the diameter of the eye. The snout is obtuse, and rises almost perpendicularly until opposite the lower margin of the eye, whence it ascends in an arcuate form to the middle of the interorbital space, while the profile formed by the occiput and the nape of the neck is slightly concave. The cleft of the mouth is small and transverse, and the upper jaw considerably overhangs the lower: the maxilla extends to beneath the posterior nostril. The anterior nostril is large and oval, and is furnished with a rather low ciliated membranaceous flap, much longer in front and behind than at the sides, while the posterior is smaller, sub-circular, and with the flap greatly reduced. The opercle is armed with a moderately strong and acute spine, which however does not extend to the margin of the skinny flap, and is separated by a deep semi-circular notch from an upper blunt point. *Teeth.*—The jaws are provided with several series of moderately elongate and compressed incisor teeth, some of which are simple, but the majority possess one, two, three, or even four pairs of lateral lobes; there are no vomerine or palatine teeth. *Fins.*—The dorsal fin commences above the extremity of the opercle; its spinous part is strongly convex along its outer edge, and is continuous with the soft part, the anterior rays of which are longer than the fifth and longest spine, which is four-sevenths of the length of the head; the upper margin of the soft dorsal is truncate and obliquely descending; the length of the pedicle between the extremity of the dorsal and the origin of the caudal fins is contained nine and three-fourths times in the total length, and is a little more than its height beneath the last dorsal ray: the anal fin is very short, the length of its base being only one-third of the distance between its extremity and the base of the caudal fin; it commences beneath the sixth or seventh dorsal ray, and terminates beneath the twelfth or thirteenth; the spines are short, the third, which is the longest, being but a third of the length of the anterior rays, which are equal in length to the head, and much longer than those of the dorsal fin: in one of my specimens the ventral fins reach to the vent, in the other only three-fourths of that distance,* nevertheless both bear a similar proportion to the head, than which they are a trifle shorter: the pectoral fin is more pointed than in *H. lophodon*; the six lower rays are simple, and the lowermost branched and first simple rays are appreciably longer than the others and equal in length to the head: the caudal fin is emarginate with acute lobes, the lower of which is the longer, one-fifth of the total length. The *scales* are small, cycloid, and adherent; the cheeks and opercles are covered with minute scales, as also is the throat, the bases of the dorsal and anal fins, and a considerable portion of the caudal fin. *Colors.*—The body and head are brownish green, the abdominal region grey, and the fins brown; all the lower parts of the body, the tail, and the fins are closely studded with small round white spots, and the outer half of the simple pectoral rays is uniform yellowish white.

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* The latter example being a gravid female, this difference may prove to be sexual or perhaps only apparent owing to the condition of the fish.

Two examples of this handsome *Haplodactylus* were collected by Messrs. Etheridge and Thorpe on the Admiralty Islets, about a mile to the north of the main Island. They were found in a rock-pool between tide-marks, and would probably have spawned there, as the ova of the female was ready for extrusion, and the milt of the male was in almost as forward a condition. The lengths of the specimens were respectively sixteen and fifteen inches, and the stomachs of both were filled with sea-weeds. I have much pleasure in dedicating this species to Mr. Robert Etheridge, jun., the able leader of the expedition. Register numbers, I. 1515-6.

LETHRINUS, *Cuvier.*

Lethrinus opercularis, *Cuv. & Val.*

Mr. Saunders collected a single specimen, measuring over sixteen inches, of this fine Sea-Bream. He informs me that the residents call it the "Red-mouthed Schnapper," and that it is not common, but is reported to be so at Norfolk Island. It is only caught by hook in deep water, and is said to be generally very good eating, but at certain seasons of the year to develop poisonous properties.

PAGRUS, *Cuvier.*

Pagrus unicolor, *Quoy & Gaim.*

One half-grown example; said to be uncommon.

CIRRHITIDÆ.

CIRRHITICHTHYS, *Bleeker.*

Cirrhitichthys splendens, *sp. nov.*

Plate II.

B. vi. D. 10/12. A. 3/6. V. 1/5. P. 8/vi—7/vii. C. 13. L. l. 43. L. tr. 5/11.

The length of the head is three and a half, the height of the body three and two-thirds in the total length; the eye is placed in the upper third of the head, and encroaches considerably on the profile; its diameter is four and three-fourths in the length of the head, and one and three-fifths in that of the snout, which is rather pointed; the interorbital space is deeply concave, and three-fourths of the diameter of the eye. The upper profile of the head is obliquely flat, and the upper jaw is decidedly longer than the lower; the maxilla reaches to the anterior fourth of the orbit, and its length is two-thirds greater than the diameter of the eye. The preorbital is as deep as long, and entire; the opercle bears two blunt flattened spines, the lower of which is much the larger; the preopercle forms a perfect arc, and is strongly denticulated on its hinder limb, the lower being entire; the post-temporal is crescentic in form, and is coarsely serrated; there is also a strong blunt spinous process at the postero-superior angle of the eye. The anterior nostril is furnished with a narrow, moderately long, ciliated flap behind. *Teeth.*—In the jaws villiform, with an outer row strongly conical, some of the posterior lateral teeth in the mandibles being curved and caninoid; there is an angular band of villiform teeth on the vomer, sparingly intermixed with conical teeth, while there is a similarly-constituted patelloid patch on the front of each palatine bone. *Fins.*—The dorsal fin begins vertically above the opercular spines, and terminates at a short distance from the caudal, the distance between the base of its last ray and the origin of that fin being equal to the least height of the pedicle, and one-third of the length of the head; there is a deep notch between the two portions of the fin, and the length of the base of the soft dorsal is five-sevenths of that of the spinous; the spines are moderately strong, the fourth and fifth equal and highest, five-twelfths of the length of the head, and four-sevenths of the anterior ray, which is elongate; the margin of the spinous dorsal is convex, that of the soft—with the exception of the anterior ray—straight and gradually descending: the anal is very short; it commences beneath the second dorsal ray, and ends beneath the ninth; its spines are strong and acute, the third the longest, two-fifths of the length of the head; the rays are much longer than the spines and than all the dorsal rays except the first: the ventral fins are inserted far back, their origin corresponding to the base of the fifth dorsal spine, and they reach to the vent; their spine is rather shorter than the third of the anal fin, and is five-eighths of the length of the longest ray, which is three-fifths of the length of the head: the pectoral fins are composed of, on one side, seven branched and seven simple rays, on the other, of eight branched and six simple, the latter being probably the normal number; the ninth ray is the longest, nine-tenths of the length of the head, and two-fifths longer than the longest-branched ray, the remaining simple rays grow gradually shorter: the caudal fin is slightly rounded, and measures five and three-fourths in the total length. The *scales* are cycloid, firmly adherent, large on the body and opercle, but minute on the cheeks, throat, and bases of the fins. The *lateral line* is almost straight, and its tubes are slightly branched. *Colors.*—The head is rich brown with numerous round crimson black-edged spots, about two-thirds of the size of a body scale; the body is pale yellowish-brown with six broad dark brown bands which almost totally obliterate the ground color superiorly, but are discontinued on the lower third of the sides, while many of the scales above the lateral line are crimson, occasionally even forming short longitudinal bars, and in front of the bases of the pectorals there are several spots similar to those on the head; the spinous portion of the dorsal fin is mottled with black, crimson, and grey; the soft is light-colored with a broad black basal band, and indications of a dusky median longitudinal band more pronounced posteriorly; the anal fin is reddish brown; the ventral fins are crimson on the inner side, while the pectoral rays are crimson, with the intervening membrane grey; the base of the caudal is crimson, the remainder grey, and it is ornamented with two rows of oblong black spots.

Mr. Saunders, who obtained a single specimen of this superb fish by hook in deep water, tells me that it was quite unknown to the islanders; it measures eight and a quarter inches. Register number, I. 1,841.

CHILODACTYLUS, *Lacépède.*

Chilodactylus vittatus, *Garr.*

Although Mr. Saunders was fortunate enough to secure a dozen examples of this species, some of which are a foot in length, he states that they were hardly known to the inhabitants. All his specimens were taken from rock-pools far out on the reefs at very low tides.

SCORPÆNIDÆ.

SCORPÆNA, *Artedi.*

Scorpæna cooki, *Gnth.*

Abundant, and considered very good eating by the islanders, who call it the "Sandy Bay Cod"; it grows to over a foot in length, and is taken in large numbers with hand-lines off the rocks.

Scorpæna scabra, *R. & O., sp.*[*]

A single specimen, three and a half inches in length, was collected by Mr. Saunders in a rock-pool.

PTEROIS, *Cuvier.*

Pterois volitans, *Linn., sp.*

The "Butterfly-fish" occurs in small numbers at all seasons of the year, and is not unfrequently washed ashore dead; it grows to a foot in length.

NANDIDÆ.

PLESIOPS, *Cuvier.*

Plesiops nigricans, *Rüpp., sp.*

A single specimen, four and a half inches in length, was obtained by Mr. Etheridge's party from a pool on the reef at low water.

CYRTIDÆ.

PEMPHERIS, *Cuv. & Val.*

Pempheris unwini, *sp. nov.*

Plate III, f. 1.

B. vii. D. 5/8. A. 3/22. V. 1/5. P. 16. C. 17. L. l. 67. L. tr. 5/14.

The length of the head is three and one-third, the height of the body three and nine-tenths in the total length; the diameter of the eye is three-eighths of the length of the head, while the snout is four-sevenths of the diameter of the eye, and the slightly concave interorbital space three-fifths of the same. The body is oblong-oval, and greatly compressed posteriorly, and the dorsal profile is not nearly so much arched as the ventral. The lower jaw is prominent, the cleft of the mouth moderately oblique, and the maxilla, which is dilated and sub-truncate posteriorly, reaches to a little behind the middle of the orbit. *Teeth.*—There is a single row of small sharp teeth on the jaws, vomer, and palatines. *Fins.*—The dorsal fin commences immediately behind the base of the pectorals, and terminates above the vent, the distance between its origin and the tip of the snout being two and four-fifths in the total length; the last spine is much shorter than the first and longest ray, which is rather more than half the length of the head: the anal fin is short and its rays are lower than those of the dorsal, the anterior one being just four-ninths of the length of the head: the ventral fin does not nearly reach the vent, and its length is about equal to that of the longest anal ray: the pectoral fin is rather long and pointed, extending backwards to opposite the vent, and is three-fourths of the length of the head: the caudal is forked, and its length is one-fifth of the total length. The pedicle is strongly compressed and low, its height being three and three-fourths in that of the body. The *scales* are small and strongly ctenoid, and the bases of the dorsal and anal fins are naked. *Colors.*—Brick-red, the head being rather darker than the body.

The species here described probably belongs to Dr. Steindachner's genus *Parapriacanthus* founded on a Japanese fish; but as the only notice of the genus which I have seen is that in the "Zoological Record" for 1870 I am unable to speak positively on this point; the two species however agree in the greatly decreased number of anal rays. The foregoing remarks apply equally to the genus *Pempherichthys* of Dr. Klunzinger (Zool. Rec. 1871), originally described from the Red Sea, with which my fish agrees in the ctenoid scales and the naked base of the anal fin. The specimen, which measures a little more than four inches in length, was picked up dead on the beach in a fresh condition. At the request of the members of the expedition, I have named this species after Mr. H. A. Unwin, of the Chief Secretary's Office, who accompanied them, and proved of great service in many ways. Register number, I. 1,478.

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[*] Described in the Proc. Linn. Soc. N. S. Wales, x, 1885, p. 577, under the name of *Sebastes scaber.*

TETRAGONURIDÆ.

TETRAGONURUS, *Risso.*

TETRAGONURUS ATLANTICUS, *Lowe.*

Full information as to the occurrence of this genus will be found in the Proc. Linn. Soc. N. S. Wales, X. 1885, p. 718; I. (2) 1886, p. 511; and III. (2) 1888, p. 9.

CARANGIDÆ.

CARANX, *Lacépède.*

CARANX GEORGIANUS, *Cuv. & Val.*

The "Trevally" is very common and grows to a large size, specimens measuring thirty inches having been recorded. It is considered one of the best food-fishes, and is used fresh, salted, or smoked.

SERIOLA, *Lacépède.*

SERIOLA LALANDII, *Cuv. & Val.*

The remarks on the preceding species apply equally to the "Yellow-tail."

PLATYSTETHUS, *Günther.*

PLATYSTETHUS CULTRATUM, *Forst., sp.*

Mr. Saunders brought back three fine examples of this fish, the largest of which measures twelve and a half inches. The islanders call them "Herrings," and when the dorsal and anal fins are laid back within their sheaths they bear a strong outward resemblance to some Clupeoids; they also go in large schools, and are considered delicious eating, whether fresh, smoked, dried, or salted; they take a bait readily, but small hooks have to be used on account of the size of the mouth.

LOPHIIDÆ.*

ANTENNARIUS, *Commerson.*

ANTENNARIUS COCCINEUS, *Less. & Garn., sp.*

Two examples, the larger four inches in length, were obtained by Mr. Etheridge's party from a pool on the reef.

GOBIIDÆ.

GOBIUS, *Artedi.*

GOBIUS ÆOLOSOMA, *sp. nov.*

B. v. D. 6. 1/9. A. 1/8. V. 1/5. P. 20. C. 15. L. l. 36. L. tr. 11.

The length of the head is from four and one-third to four and one-half, the height of the body from six and one-fifth to six and four-fifths in the total length. The eyes are situated high up on the head, and their diameter is three and four-fifths in the length of the head, and equal to that of the snout. The interorbital space is slightly concave, and but two-fifths of the diameter of the eye. The head is much broader than high, and the snout is very obtuse, and rises abruptly to the level of the occiput; the cleft of the mouth is but little oblique, being entirely below the level of the orbit; the jaws are equal, and the maxilla extends to the vertical from the middle of the eye. *Teeth.*—Both jaws are armed with a broad band of villiform teeth, the outer row being greatly enlarged and conical, while the front teeth are the strongest and slightly curved. *Fins.*—The dorsal fins are separated by an interspace equal to the diameter of the eye*; the spines are weak and terminate in silky filaments; the third is the longest, about one-half of the length of the head, but not so high as the second dorsal: the anal fin commences beneath the first and ends beneath the eighth dorsal ray: the ventrals do not extend to the anus, their length being five-sixths of that of the head, while that of the pectorals is about equal to the head; these latter extend to the vertical from the anus, and have the five or six upper rays silk-like: the caudal fin is wedge-shaped, its central rays being the longest, and about one-fifth of the total length: the length of the pedicle is equal to that of the postorbital portion of the head. The *scales* are ctenoid, and extend forward to opposite the posterior edge of the preopercle; there are eleven rows between the origin of the second dorsal and the anal; the cheeks and gill-coverts are naked. *Colors.*—Rich brown above, yellow below; a series of about nine oblong dark-brown spots along the middle of the sides, each about one scale in breadth, and from two to four in length; some irregular dark spots between these and the dorsal profile; a dark spot on the opercle; mandibles yellowish; chin dark brown; remainder of head mottled in two shades of brown; all the fins hyaline, the dorsals and caudal with brown dots.

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* For the same reason that I have adopted the name *Chætodontidæ* for the *Squamipinnes*, I would suggest the name *Lophiidæ* for the *Pediculati*. (See note on p. 55.)

Two specimens of this handsome little Goby were brought back by our collectors, both having been obtained under stones between tide-marks, and the larger measuring almost three inches. Register numbers, I. 1,488 and I. 1,849.

GOBIOIDES, *Lacépède.*

Gobioides, *sp.*

A single example, which has evidently been washed ashore, was presented by Dr. James Cox to the Hon. Wm. Macleay, in whose collection it now is.

BLENNIIDÆ.

PETROSCIRTES, *Rüppell.*

Petroscirtes, *sp.*

A five-inch example in bad condition, having evidently been dried, was obtained by purchase in 1882.

SALARIAS, *Cuvier.*

Salarias variolosus, *Cuv. & Val.*

Several examples, the largest measuring five inches, were obtained by Mr. Saunders under stones at low water.

Salarias marmoratus, *Benn., sp.*

Three specimens; largest, four and a half inches, with last species.

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* Measured from base of last spine of first to origin of second dorsal.

SALARIAS QUADRICORNIS, *Cuv. & Val.*

Three specimens; largest five inches; in rock-pools and under stones between tide-marks.

CRISTICEPS, *Cuv. & Val.**

CRISTICEPS AURANTIACUS, *Cast.*

A single example, about four inches in length, was presented to the Museum by Mr. Langley.

CRISTICEPS ROSEUS, *Gnth.*

Mr. Saunders brought back a small *Cristiceps* in bad condition, which agrees better with the above species than with others with which I have had an opportunity of comparing it.

TRIPTERYGIUM, *Risso.*

TRIPTERYGIUM ATROGULARE, *Gnth.*

Mr. Saunders brought back numerous examples of this pretty little Blenny; they vary greatly in the amount of black on the head and breast, several specimens being absolutely without any indication of this color.

ACANTHOCLINIDÆ.

ACANTHOCLINUS, *Jenyns.*

ACANTHOCLINUS LITTOREUS, *Forst., sp.*

Plate III, f. 3.

This species was found by Mr. Saunders to be very common under stones and in pools between tide-marks; like the preceding it is variable in its coloration, one specimen especially being distinctly banded. I give a figure of this individual for whom, should it prove distinct, *A. fasciolatus* would be a most appropriate name.

MUGILIDÆ.

MYXUS, *Günther.*

MYXUS ELONGATUS, *Gnth.*

These Mullet are abundant at all seasons, and form a staple article of food among the islanders, either fresh, salted, or dried.

GOBIESOCIDÆ.

DIPLOCREPIS, *Günther.*

DIPLOCREPIS COSTATUS, *Ogilby.**

There are two very small specimens among the fishes brought by our collectors, both, as usual, taken while adhering to the lower side of a stone between tide-marks.

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* Count Castelnau has described so many (*seven*) species of *Cristiceps* without sufficiently diagnosing them, that I am unwilling to add to the confusion caused thereby by describing these two species as new. The specimen which I have called *C. aurantiacus* differs from all other examples which I have seen by the great length and tenuity of the caudal pedicle, which is two-thirteenths of the total length without the caudal fin, and whose height is but a sixth of its length. Its color is pale yellowish-brown, the fins of a rather darker shade. Should it prove to be a good species, *C. pedicillatus* would be an excellent name for it.

† Described in the Proc. Linn. Soc. N. S. Wales, x, 1885, p. 270.

ACANTHOPTERYGII PHARYNGOGNATHI.

GLYPHIDODONTIDÆ.

AMPHIPRION, *Bl. Schn.*

Amphiprion melanopus, *Blk.*

Mr. Saunders brought back two fine specimens—the larger measuring four and a half inches—of an *Amphiprion*, which agrees in everything with the above-named species, except that in both the dorsal and pectoral fins are black, and in the larger the opercular stripe is absent; he informs me that they are rare, and were taken in a rock-pool.

POMACENTRUS, *Cuvier.*

Pomacentrus fasciolatus, *sp. nov.*

B. v. D. 13/17. A. 2/13-14. V. 1/5. P. 20—21. C. 15. L. l. 29. L. tr. 3/11.

The length of the head is from four and a half to four and three-fourths, the height of the body from two and seven-tenths to two and nine-tenths in the total length. The diameter of the eye is from three and one-third to three and two-thirds in the length of the head, nine-tenths of that of the snout, and four-fifths of the convex interorbital space. The upper profile from the tip of the snout to the origin of the dorsal fin is a regular and gentle curve. The greatest depth of the preorbital, which is entire, is about two-thirds of the diameter of the eye. The suborbital ring and the preopercle are coarsely denticulated, the teeth at the angle of the latter being much the strongest; there is a single small spine on the opercle. The maxilla extends almost to the anterior margin of the eye. *Fins.*—The dorsal spines are of moderate length and strong, the last eight sub-equal in length, and from three-fifths to four-sevenths of the length of the head, and about three-fourths of the middle dorsal rays, which are slightly longer than the base of the soft dorsal, as also are the anal rays, both of these fins being pointed: the second anal spine is very strong, longer than the longest dorsal spine, being about two-thirds of the length of the head: the first ventral ray is produced into a filament which reaches to the vent, and is equal in length to the head, while the pectoral fin is of a similar length: the caudal fin is slightly longer than the head, and is emarginate, each lobe being obtusely rounded. *Scales.*—The inferior half of the dorsal and anal fins are covered with scales which are much smaller than those on the body. *Colors.*—Dark brown, each row of scales on the body and tail having its anterior half pale yellowish-brown, so as to form numerous bands slightly broader than the intervening ground color; the opercles, cheeks, throat, and base of the anal fin are prettily marked with round light blue spots; all the fins are black, except the pectorals, which are bluish-brown.

Mr. Saunders collected several specimens of this handsome fish, all obtained from rock-pools, in which he tells me they are very common; the largest measured six and a half inches, the smallest one and two-thirds. This species is undoubtedly closely allied to *Pomacentrus scolopsis*, but the constancy of the number of the dorsal spines, of the slightly larger number of scales on both lateral and transverse lines, of the more elongate form, and of the absence of the black spot on the dorsal fin have induced me to consider it distinct. Register numbers, I. 1,897—I. 1,902.

GLYPHIDODON, *Lacépède.*

Glyphidodon cœlestinus, *Cuv. & Val.*

This species is very abundant in pools on the reefs, and numerous examples were obtained by Mr. Saunders.

GLYPHIDODON POLYACANTHUS, *sp. nov.*

B. VI. D. 14/13. A. 2/14. V. 1/5. P. 16—18. C. 17. L. l. 27. L. tr. 4/10.

The length of the head is from four and a half to four and three-fourths, the height of the body rather less than three in the total length. The diameter of the eye is from two and four-fifths to three and two-fifths in the length of the head, equal to or in large examples rather less than that of the snout, and equal to or five-sixths of the interorbital space, which is slightly convex. The greatest depth of the preorbital is almost equal to the diameter of the eye. The maxilla does not nearly reach the anterior margin of the orbit. *Fins.*—The dorsal spines are strong and moderately high, the middle ones rather higher than the posterior, about three-fifths of the length of the head, and two-thirds of that of the middle dorsal rays, which are one-half longer than the base of the soft portion of the fin, which is rather pointed: the second anal spine is very strong, slightly curved backwards, and equal to or but little more than the longest dorsal spine; the soft portion of the fin is rounded, the middle rays being barely longer than the base: the first ventral ray is produced into a filament, which reaches to the middle of the anal fin, and is one-third longer than the head: the pectoral fin is well developed, about one-sixth longer than the same: the caudal fin is forked with the lobes, more or less rounded in adults, but acutely pointed in young and half-grown examples, the upper much longer than the lower, and from one-seventh to one-third longer than the head. The *lateral line* ceases beneath the middle of the soft dorsal. *Colors.*—Varying with age; adult specimens are dull brown without any trace of markings whatever; the soft dorsal, anal, caudal, and ventral fins black, the pectorals yellowish-brown; half-grown examples are pale violet-brown shading into yellowish-brown on the lower third of the body; cheeks, opercles, and preorbitals with numerous round spots and short streaks of sky-blue; occiput and scales on the anterior part of the back above the pectoral fins with minute dots of the same color; a row of similar spots from the snout, where it joins the corresponding one of the opposite side, through the upper part of the eye to the dorsal ocellus, which is black, surrounded by a circle of blue spots, and lies beneath the tenth to thirteenth dorsal spines; a similar but smaller spot on the last two rays and the anterior part of the pedicle; vertical fins of the same shade as the body; ventrals and pectorals yellow or grey; a black spot at the base of the lateral line and another in the axil of the pectoral. In the young the ground color of both body and fins is pale buff, and the arrangement of the ornamental markings is similar to that of the half-grown, but the spots are much more accentuated, and the naso-dorsal line is composed of confluent blue black-edged spots.

In the series of ten examples received through Mr. Saunders, there are almost endless modifications of the colors above given, which however appear to be typical of the three stages of growth mentioned, and I am satisfied that they are the various ages of the same fish, while the difference in coloration is to my mind easily accounted for thus: The young frequent shallow rock-pools with a sandy or coralline bottom, exposed to the full light of the sun, and naturally assume a tint similar to their surroundings, but as they increase in size they gradually retire to the larger and deeper pools near the outer edge of the reefs, which are only exposed at low spring tides, and whose sides are covered with a rank growth of seaweeds, and here they take on the more sober livery of the adult fish.

Both in the inconstancy and the pattern of its coloration the present species bears a striking resemblance to *Glyphidodon brownriggii* but here again I am confronted by the unbroken constancy through a most typical series of a number of dorsal spines, not only abnormal in that species, but, according to all the authors whom I have had an opportunity of consulting, also abnormal in the genus, where thirteen is given as the maximum. It is however worthy of remark that in the ninth volume of the "Atlas Ichthyologique"—of which I have not seen the letter-press—Dr. Bleeker figures *Glyphidodon leucogaster* and *Glyphidodontops zonatus* with fourteen dorsal spines. Now in the "Fische der Sudsee," Heft v. p. 232, Dr. Günther makes the latter species a synonym of *G. brownriggii*, but still holds to the thirteen dorsal spines; so that Dr. Bleeker's *G. zonatus* may be the same as the species above described, though none of my examples show the slightest trace of a zone, in which case my name would have to stand, his having been previously utilized by MM. Cuvier and Valenciennes.

My specimens measure from two to six inches in length; they are very common in all the reef-pools.

According too to Dr. Day ("Fishes of India," p. 387) *G. brownriggii* has only five branchiostegal rays, whereas my species undoubtedly has six. Register numbers, I. 1903—I. 1910.

PARMA, *Günther*.

Parma polylepis, *Gnth.*

This species is well known to the islanders by the name of "Sailor Fish," and though it grows to a foot in length is not used as food. They are common in the rock-pools, and Mr. Saunders tells me that he could only get the larger examples by hook and line, and that each has his own lurking-place, whence he rushes out to seize the bait, and carries it back immediately to devour at his leisure. Our eight specimens measure from one to ten inches. Owing to their similar habits of life, it is not surprising to find that they are quite as variable in coloration as the last species; the adults being uniform purplish-black, and provided with four coarse bony protuberances on the head, one above the middle of each eye, and two on the occiput, these latter being sometimes confluent.

HELIASTES, *Cuv. & Val.*

Heliastes hypsilepis, *Gnth.*

Though originally described from Port Jackson, no example is to be found in the Australian Museum nor in that of the Hon. Wm. Macleay, and I was therefore agreeably surprised to find two specimens among the Lord Howe Island collections. Both were obtained from reef-pools, and they are said to be rare; they measure respectively six and two-thirds and five and a half inches.

LABRIDÆ.

COSSYPHUS, *Cuv. & Val.*

Cossyphus atrolumbus, *Cuv. & Val.*

Mr. Saunders obtained a single specimen of this beautiful fish, which was taken by hook in water about twelve fathoms deep, and is said to be very rare.

LABRICHTHYS, *Bleeker*.

Labrichthys inscripta, *Rich.*

This "Parrot Fish" (all the members of the family go by the same name) is abundant, and as it grows to at least eighteen inches and is easily obtained, it is esteemed as an article of food; it is almost entirely taken by hook and line.

LABRICHTHYS LUCULENTA, *Rich.*

Quite as common as the preceding species, but of no value, since its maximum length does not exceed seven inches. The variety with only a black spot between the two first dorsal spines, and that with other spots on the rays and lines on the snout are about equally divided as to number.

LABROIDES, *Bleeker.*

LABROIDES PARADISEUS, *Blk.*

Mr. Saunders collected from a pool on the reef an example measuring close on five inches, and informs me that it is both scarce, and from its quick movements difficult to capture.

ANAMPSES, *Cuvier.*

ANAMPSES ELEGANS, *sp. nov.*

B. vi. D. 9/12. A. 3/12. V. 1/5. P. 12. C. 14. L. l. 26. L. tr. 4/10.

The length of the head is three and a half, the height of the body four in the total length. The diameter of the eye is four and two-thirds in the length of the head, two-thirds of that of the snout, and rather less than that of the flattened interorbital space. The mouth is small and oblique, and the maxilla does not extend to the vertical from the anterior nostril. The curve of the lateral line commences beneath the eighth dorsal ray. *Colors.*—Upper half of the head and back pale brown; sides and tail yellowish-gray; lower half of the head and thoracic region silvery; some blue dark-edged spots and lines on the upper surface of the head and behind the eye; scales between the lateral line and dorsal fin with numerous blue dots and transverse lines; below the lateral line seven longitudinal golden bands, as wide as the interspaces, which are ornamented by numbers of blue spots, which however fade gradually towards the abdominal region, which is immaculate. The dorsal and anal fins are golden with a very narrow dark border, the former with a basal and median row of pale-blue dark-edged spots, the latter spotless; the caudal fin is golden with its outer margin greyish; the pectorals and ventrals are grey, the base of the former with a broad golden band.

Mr. Saunders collected several specimens of this handsome *Anampses*, all of which measure between four and five inches in length, and were obtained from pools on the reefs. Register numbers, I. 1932—I. 1937.

ANAMPSES TWISTI, *Blk.*

A young example, but four inches long, was brought back by Mr. Saunders, and belongs I think to this species.

ANAMPSES VARIOLATUS, *sp. nov.*

B. vi. D. 9/12. A. 3/12. V. 1/5. P. 13. C. 14. L. 1.28. L. tr. 6/11.

Colors.—Pale reddish-yellow with a broad brown band from the middle of the operculum through the eye to the anterior edge of the snout, where it joins the corresponding band on the opposite side; a curved band from the centre of the cheek to the angle of the preopercle; occiput brown; body with brown blotches, which sometimes coalesce to form semi-transverse bands, and are visible but indistinct on the dorsal fin; a broad silvery band from the mouth to the opercle, partly interrupted by the curved brown band, and continued as far as the caudal fin by means of large irregular blotches; above this is a much narrower and more indistinct band of similar blotches; the fins are pale yellow, with a small round black spot on the two penultimate rays of the dorsal and anal.

I have a single immature specimen only of this species, but the colors are so different from those ordinarily found in this genus that I am compelled to describe it as new. Register number, I. 1938.

STETHOJULIS, *Günther.*

Stethojulis axillaris, *Quoy & Gaim.*

A single small example was taken from a rock-pool by Mr. Etheridge's party.

PLATYGLOSSUS, *Günther.*

Platyglossus pseudominiatus, *Blk.*

A single specimen, collected by Mr. Saunders, and measuring four and a half inches, seems to belong to this species.

Platyglossus trimaculatus, *Quoy & Gaim.*

A number of examples, of from five to seven inches in length, were obtained by Mr. Saunders from pools on the reefs where they are common.

JULIS, *Cuv. & Val.*

Julis lunaris, *Linn.*, *sp.*

Abundant in the larger pools on the reefs, where it grows to at least ten inches in length, but is not used as food so far as I can ascertain.

Julis trilobata, *Lacép.*, *sp.*

Not uncommon, and taken principally by means of lines on rocky ground off shore, but small examples may occasionally be found in pools left uncovered by the lowest tides; they grow to eighteen inches in length, and are used, but not esteemed, as food.

CORIS, *Lacépède.*

Coris aygula, *Lacép.*

The colors of these fishes vary so greatly with age, and no doubt also with their surroundings, that when the size of the scales and the comparative measurements* are found to differ but little in individuals from the same locality, it seems to me unnecessary and unscientific to describe such as new species from the mere fact of this variance. I have therefore decided to content myself with giving the life-colors of the five specimens which I have determined as belonging to this species, in the hope that such a course will tend to elucidate the life-history of this remarkable Labroid, and perhaps throw some light on the causes, the outcome of which is the variation here recorded. This is as follows:—

Nos. 1 & 2 are adult specimens, measuring respectively twenty-three and twenty-eight inches; the body and head are very dark purple, while the fins are violet, and the head is furnished with a prominent bony knob on the occiput, similar to that which is found on the adult Schnapper (*Pagrus unicolor*).

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* All Ichthyologists will of course make allowance for the great differences which occur almost invariably in the measurements of the young and adult stages of the same fish.

Our next specimen, No. 3, which is slightly over eight inches in length, is much lighter in color, and has the vertical fins of the same shade as the head and body, but with a darker intramarginal line; at this age there is no sign of the occipital knob.

Specimen No. 4 is four inches long; its head is purple, beautifully ornamented on the cheeks and opercles with bluish-white spots and short crescentic or wavy lines, while the opercular flap is jet black; on the abdominal region the lines are longer and more pronounced, forming partially interrupted bands between the isthmus and the vent; the colors grow gradually lighter on the body and tail, and the stripes, which are very irregular in direction and often broken up into rows of spots, are duller and broader; the dorsal and anal fins are violet, with a narrow white margin, the former with numerous oblique silvery streaks running downwards and backwards, the latter with a median longitudinal dull grey streak, which is joined to the base of the fin by similar bars; the caudal fin is also violet, with small white spots on the rays and a white terminal border, broadest at the angles; the ventrals have the three inner rays white, the others purple; the pectorals are grey with a broad purple basal band.

Specimen No. 5 is but two inches and one-third in length; its ground color is also purple, and grows gradually lighter posteriorly; the head is ornamented with milk-white bands and spots, the upper of which runs from the angle of the intermaxillaries to the middle of the interorbital space, and throws off a narrow forked band opposite the front margin of the orbit, the anterior branch of which is very short, while the posterior branch forms a very narrow streak which skirts the upper margin of the eye, behind which it forms an irregularly oblong blotch, which itself terminates in a narrow band at the origin of the lateral line; a similar but interrupted narrow band runs from immediately above the angle of the mouth to the axil; on the mandibulary region there are several series of white bands and spots, which are continued on the ventral and abdominal regions; the back is beautifully ornamented with three large milk-white blotches, the anterior of which lies beneath the five first dorsal spines, upon which however it does not encroach, and through the middle of which the lateral line runs, while some of the scales near that line are very dark purple with a central milky dot; the second lies between the lateral line and the median line of the third to seventh rays, while the third ornaments the inferior third of the last two rays and forms an arch across the pedicle almost as far as the base of the caudal fin; below this there are four similar blotches, the anterior of which is hidden by the pectoral fin: the dorsal and anal fins are deep violet with the tips of the rays white, the former with some spots and oblique white stripes, the latter with a basal band of the same hue; the caudal fin is purple with two slightly convergent oval spots on either side of the base, and a crescentic spot with the arc pointing forward between and behind their posterior angles; the entire margin, especially at the angles, is broadly tipped with silver, and a few other scattered white dots are visible; the ventrals and pectorals are similar to those in the preceding form.

If Dr. Day is correct in placing *Labrus cingulum* and *L. aureomaculatus* among the synonyms of *Lacépède's Coris aygula* (*vide* "Fishes of India," p. 408), it is evident that this species is more than ordinarily variable in its colors, even in a family so variable as that to which it belongs.

This fish is common, and is taken when young or half-grown in the rock-pools, while the adults are taken by line in the open sea and are eaten with avidity. They are called "Double-heads" by the islanders.

CORIS SEMICINCTA, *Ramsay*.*

The type specimen was sent from Lord Howe by Capt. Armstrong, some years ago; the species appears to be rare everywhere, two only having come to hand since that time, these being respectively from Broken Bay and Port Jackson; all three measure about ten inches.

SCARICHTHYS *Bleeker*.

SCARICHTHYS AURITUS, *Cuv. & Val.*

Young examples up to six inches in length are common in the rock-pools; all the specimens have nine anal rays.

PSEUDOSCARUS, *Bleeker*.

PSEUDOSCARUS, *sp.*

A twenty-six inch specimen, in an advanced stage of decomposition, was picked up on the beach by Mr. Whitelegge, but is in so bad a state that I am unable to determine the species.

ANACANTHINI.

GADIDÆ.

LOTELLA, *Kaup*.

LOTELLA, *sp.*

The only specimen I have seen was obtained by purchase in February, 1882, and is, besides being small—less than five inches in length—in such bad condition as to render it impossible to determine the species with accuracy.

PLEURONECTIDÆ.

SOLEA, *Klein*.

SOLEA RAMSAII, *sp. nov.*

Plate III, f. 4.

D. 71. A. 47. V. 5. C. 14. L. l. 87.

The length of the head is one-fifth, the height of the body three-tenths of the total length. The upper eye extends half its diameter in advance of the lower; the diameter is equal to the length of the snout, and the interorbital space, which is scaly, is three-tenths of the same. The upper jaw overhangs the lower, and is produced into a lobe. The cleft of the mouth hardly extends beyond the anterior margin of the lower eye. The anterior nostril on the colored side is tubular, and the snout is provided with a few filaments. *Teeth.*—Distinct on the blind side. *Fins.*—The dorsal fin commences in front of the middle of the lower eye, and ends one diameter of the eye from the base of the caudal; the anterior rays bear a filamentous appendage, some of which, on the upper surface of the head, are as long as the ray itself: the anal fin commences behind the vertical from the gill-openings: the ventral fins are separate from the anal: pectorals absent: the height of the pedicle between the terminations of the dorsal and anal fins is half of the length of the caudal, which is equal to that of the head. *Scales.*—Ctenoid on both sides, and extending a short distance up the rays of the vertical fins. The *lateral line* is straight, and there is a second short line on the blind side from the middle of the snout immediately below the base of the dorsal to beneath the eighteenth ray of that fin. *Colors.*—Pale yellow with many small black spots and short wavy lines on the head and body, which on the lateral line take the form of streaks extending over from two to five scales; the fins are hyaline, all except the ventrals being closely dotted with white and black.

A small example three inches in length was obtained by Mr. Saunders. Register number, I. 1,951.

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* Described in the Proc. Linn. Soc. N. S. Wales, VII, 1882, p. 301.

PHYSOSTOMI.

SILURIDÆ.

PLOTOSUS, *Lacépède.*

PLOTOSUS ARAB, *Forsk., sp.*

Abundant both in rock-pools and in the open sea, where it is taken by hand-lines; it grows to at least twelve inches in length, and is not used as food.

SCOPELIDÆ.

SAURUS, *Cuvier.*

SAURUS VARIUS, *Lacép., sp.*

A single specimen measuring seven inches was taken in a seine, and secured for us by Mr. Saunders, who considers it rare.

SCOMBRESOCIDÆ.

SCOMBRESOX, *Lacépède.*

SCOMBRESOX FORSTERI, *Cuv. & Val.*

Two specimens, each of a length of twelve inches, were obtained by our collectors, who state that they are rare, one or two only being taken in the nets along with the succeeding species.

HEMIRHAMPHUS, *Cuvier.*

HEMIRHAMPHUS INTERMEDIUS, *Cant.*

Abundant at certain seasons and growing to at least fifteen inches; they are taken in vast numbers by means of the seine net, and are much and justly esteemed as food.

EXOCŒTUS, *Artedi.*

EXOCŒTUS DOVII, *Gill.*

Like *Scombresox forsteri* this species occurs occasionally in the nets among the Garfishes.

STERNOPTYCHIDÆ.

STERNOPTYCHIDES, *Ogilby.*[*]

Pseudobranchiæ present. Head and trunk much elevated and compressed, the latter passing gradually into the moderately long pedicle. Eyes large, directed upwards and outwards, and divided by an elevated bony ridge; cleft of mouth deep, and almost vertical; jaws equal when closed. The margin of the upper jaw is formed of the inter-maxillary and maxillary, each of which bears a row of long recurved teeth at a considerable distance from one another; mandible with a similar row, one of which on either side is much more developed. Dorsal fin short, preceded by an osseous plate pierced by neural spines. Adipose fin present or absent. Pectoral fins well developed. Ventrals moderate. Gill-openings wide; gill-rakers long. Body covered with a silvery pigment, but with no distinct scales. A series of imbricate scutes along the edge of the abdomen, forming with the prolonged pubic bones a slightly-serrated margin. Two series of phosphorescent spots along the lower side of the head, body, and tail.

STERNOPTYCHIDES AMABILIS, *Ogilby.*

D. 5/11—12. A. 13 (?). V ?. P. 10 ?. C. 6/18/6.[†]

The greatest height of the body is three-fifths of the total length. Least height of pedicle about one-tenth of that of the body. Length of the snout one-half of the diameter of the eye. Teeth and fins as in generic diagnosis. *Colors.*—Silvery.

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[*] Described in the Proc. Linn. Soc. N. S. Wales, III (2), 1888, p. 1313.

[†] The specimens are in such bad condition that it is impossible to give the fin formula with certainty.

The three specimens examined by me, the largest of which is barely two inches in length, were picked up dead on the beach by Mr. Thomas Brown, who brought them to Sydney and gave them to Mr. George Masters, by whom they were placed in the Macleay Museum where they now are; and I am indebted to the Hon. Wm. Macleay for permission to describe them.

GONORHYNCHIDÆ.

GONORHYNCHUS, *Gronovius.*

GONORHYNCHUS GREYI, *Rich., sp.*

This species is common on the sandy beaches, and grows to at least eighteen inches in length; its flesh is excellent.

CLUPEIDÆ.

SPRATTELLOIDES,* *Bleeker.*

SPRATTELLOIDES GRACILIS, *Schleg., sp.*

A three-inches example was collected by Mr. Etheridge's party, and was the only one seen.

MURÆNIDÆ.

ANGUILLA, *Cuvier.*

ANGUILLA AUSTRALIS, *Rich.*

Very common in all the fresh and brackish water pools on the island, but seemingly not growing to a size of more than two feet; it takes a bait freely but is not eaten.

CONGROMURÆNA, *Kaup.*

CONGROMURÆNA MELLISSII, *Gnth.*

An eel sent to the Museum in 1882 agrees so well with this Atlantic species that I consider it unnecessary to separate them, at least until I can obtain other specimens in better condition.

MURÆNA, *Artedi.*

MURÆNA AFRA, *Bl., sp.*

This seems to be the most common Eel on the shore, and is easily obtained under stones between tide-marks up to a length of at least two feet; its flesh is excellent.

MURÆNA NEBULOSA, *Ahl.*

One example, which was obtained in a small pool on the reef, was brought back by Mr. Etheridge's party; it is said to be uncommon.

LOPHOBRANCHII.

SYNGNATHIDÆ.

SOLENOGNATHUS, *Kaup.*

SOLENOGNATHUS SPINOSISSIMUS, *Gnth.*

Frequently washed ashore after heavy storms.

HIPPOCAMPUS, *Leach.*

HIPPOCAMPUS ABDOMINALIS, *Less.*

Not uncommon in the pools on the reefs, or washed ashore with the preceding species; it grows to the length of twelve inches.

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* Surely this is the correct orthography.

PLECTOGNATHI.

MONACANTHIDÆ.*

BALISTES, *Artedi.*

BALISTES, *sp.*

The upper jaw of a species of this genus was picked up on the beach by Mr. Saunders.

MONACANTHUS, *Cuvier.*

MONACANTHUS HOWENSIS, *sp. nov.*

D. 35. A. 31. P. 14—15. C. 12.

The distance between the tip of the snout and the upper angle of the gill-opening is three and two-fifths in the total length; the body is compressed and elevated, its height at the origin of the dorsal fin being two and one-fifth in the same. The eye is of moderate size, placed far back on the head, and not much below the frontal edge; its diameter is one-fourth of the length of the snout, two-thirds of the interorbital space, and four-sevenths of the branchial slit, the upper angle of which lies slightly behind its posterior margin, while the lower is opposite to the middle of the base of the pectoral fin. The upper profile of the snout is slightly concave, while that of the back is sinuous, and rises gently to the origin of the rayed fin. *Fins.*—The dorsal spine is strong, with an almost imperceptible convexity in front; it is inclined slightly backwards, and is situated above the middle of the orbit, its height being four-fifths of the length of the snout; it is armed with four rows of short stout conical teeth, which are bent downwards, and the anterior pair of which are much closer together than the posterior, and reach to the extreme tip of the spine, which the latter do not; the anterior and lateral edges of the spine between the rows are covered with irregularly-set small rugosities, especially on the basal portion. The origin of the soft dorsal is one-ninth nearer to the end of the caudal fin than to the tip of the snout, while the intradorsal space is but a fraction less than the length of the snout; both the dorsal and anal fins are moderately high, with a convex outer margin, and the latter commences beneath the ninth dorsal ray; the ventral spine is of moderate size and immovable, and is furnished with a lateral row of short conical teeth, the lower surface being also covered with granular projections; its tip is just half-way between the tip of the snout and the end of the tail; the pectoral fins are short, slightly convex posteriorly, and rather less than the length of the snout; the caudal fin is rounded, its middle ray being one-sixth of the total length. *Scales.*—The body is covered with small, spinate, transversely oblong scales, and is without cutaneous appendages; there are two pairs of short, upright, conical spines on each side of the pedicle, the upper pair about equally distant from the lower as they are from the dorsal profile. *Colors.*—Appear to have been olive-brown with numerous round white spots on the sides of the head and body; the dorsal, anal, and pectoral fins are pale yellow, the caudal dark brown.

Mr. Etheridge's party obtained a single specimen, taken by hook in about ten fathoms water between the main island and the Admiralty Islets, and measuring rather less than eight inches. Register number, I. 1,566.

OSTRACION, *Artedi.*

OSTRACION CONCATENATUS, *Bl.*

Is washed ashore commonly after heavy storms.

OSTRACION FORNASINI, *Bianc.*

Does not seem to be so common as the preceding species, nor to grow to an equal size, but is obtained only by the same means.

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* See note on p. 55.

TETRODONTIDÆ.*

TETRODON, *Linnæus.*

TETRODON HISPIDUS, *Linn.*

Mr. Saunders obtained a single young example from a pool on the reef.

TETRODON VALENTINI, *Blk., sp.*

Collected with the preceding.

TETRODON CALLISTERNUS, *sp. nov.*

Plate III, f. 5.

D. 11. A. 10. P. 16. C. 9.

The length of the head is two-sevenths of the total length. The eyes are situated in the posterior half of the head, and their diameter is from three-fifths to one-half of the length of the snout; the nasal organs are inconspicuous; the dorsal profile is compressed into a distinct keel, which in the larger example has its origin in a bony knob. *Fins.*—The distance between the tip of the snout and the origin of the dorsal fin is four-sevenths of the total length, while that between the last ray and the root of the caudal fin equals the snout, and also the height of the pedicle immediately behind the anal fin, which is situated entirely behind the dorsal: the pectoral fins are short: the caudal, which is slightly concave posteriorly, is three-fourths of the length of the head. Cheeks, upper part of the head, and a strip along the dorsal and abdominal profiles, reaching nearly as far back as the vertical from the origin of the dorsal, armed with a few scattered strong three-rooted spines; the rest of the body and tail smooth. *Colors.*—The upper part of the body from the angle of the jaws passing obliquely upwards to a short distance beneath the eye, and thence following the curve of the back and on to the tip of the two upper caudal rays dark brown; the head with four blue black-edged lines running obliquely upwards from the snout through the eye, behind which they bend more abruptly upwards to meet the corresponding lines of the opposite side on the occiput; the anterior part of the snout and the interorbital space are ornamented with narrow black transverse lines joined on the rest of the snout by similar longitudinal lines; from the mandibular region touching the base of the pectoral fin and ending on the two lower caudal rays there is a narrow dark-brown band, parallel to the lower edge of the dorsal zone, and between these a pale yellowish band, the lower parts of the head and body being also of this color; these bands are much more pronounced in the smaller (four inches) than in the larger (seven inches) specimen; the sides of the head are ornamented with numerous blue black-edged bands and oblong spots, posteriorly almost rectangular to the ocular bands, but becoming much more horizontal on the chin, down the middle of which is a short longitudinal band; the entire body and tail is thickly crowded with oblong or round blue dark-edged spots, which are minute on the upper surface, and gradually increase in size until on the under parts they are as large or larger than the pupil; the throat is transversely banded. The dorsal and anal fins are pale yellow with the base dark brown, and the former has two or three irregular pale-blue bands on the inner half; the caudal has eight or nine interrupted brown transverse bands.

Two examples were obtained by our collectors on the reef, but they are said to be rare. Register numbers, I. 1,485 and I. 1,965.

DIODON, *Linnæus.*

DIODON HYSTRIX, *Linn.*

Mr. Saunders brought back a half-grown specimen which he found dead on the beach.

J. DOUGLAS OGILBY.

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* See note on p. 55.

No. 4.

THE INSECT FAUNA OF LORD HOWE ISLAND.

BY

A. SIDNEY OLLIFF,

Assistant in Zoology, Australian Museum.

THE INSECT FAUNA OF LORD HOWE ISLAND.

WITH the exception of two Rhynchophora, described by MM. Saunders and Jekel in 1855, and two Longicorns, made known by Messrs. Adam White and J. Thomson, nothing of importance was published concerning the insects of Lord Howe Island until the year 1874-5, when Mr. F. P. Pascoe described a few remarkable forms from material collected by Mr. G. Masters. Beyond these scattered but interesting descriptions nothing has appeared on the insect fauna of the Island, and I, therefore, propose in this paper to submit all the material to which I have been able to obtain access to a careful examination. The greater part of this material is contained in the collection of the Australian Museum, but I have also had at my disposal a few species from other sources. The collections from Lord Howe Island in the former are mainly the result of Mr. Masters' labours, during three days collecting in June, 1869, and of those of Mr. Etheridge's party, which visited the island, at the instance of the Trustees of that Institution, in August, 1887, and of the efforts of Mr. E. H. Saunders, who made considerable collections there in the beginning of the following year. The latter collection is of special interest in that it contains a number of insects from the summit of Mount Lidgbird, a rocky peak, some 2,500 feet high, of which the entomology was previously unknown.

The insect fauna of Lord Howe, viewed in relation to generic distribution, displays a marked affinity to the fauna of the Australian sub-region, such as we should expect from the geographical position of the island. Indeed, with the exception of the endemic genera, the only extra-Australian forms with which I am acquainted are two genera of Longicorns, *Somatidia* and *Xyloteles*, both typical of New Zealand. I have already stated* my belief that the insect-fauna of Norfolk Island, the other oceanic dependency of New South Wales, is essentially Australian in its character, and in support of my conclusion I have given a list of the species as far as they are known to me. I now propose to adopt a similar course with the insects of Lord Howe Island, and to illustrate the relationship of the Coleoptera with those of the mainland by a table showing the distribution of the genera and species. A glance at this table will bring to light the two prominent features of the fauna,—1st. That the more conspicuous genera (*e.g.*, *Scaraphites*, *Lamprima*, *Isodon*, *Saragus*, *Leptops*, *&c.*) are peculiarly Australian;—2nd. That the Island contains a number of highly-modified endemic forms, *e.g.*, *Cormodes*, *Embaphiodes*, *Æthreus*, *Hybomorphus*, *Blax*, *&c.*

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* Report on a Small Zoological Collection from Norfolk Island.—Proc. Linn. Soc. N.S. Wales, 1887, II, pp. 1001-1014.

TABLE OF COLEOPTERA SHOWING GEOGRAPHICAL AFFINITIES.

A. Genera or Species of wide or cosmopolitan range.
B. Genera or Species which extend to Malaysia or the Polynesian Islands.
C. Genera or Species which are common to Australia and New Zealand.
D. Genera or Species which are confined to Australia.
E. Genera or Species which are confined to New Zealand.
F. Genera or Species which are peculiar to Lord Howe Island.
G. Genera or Species which are common to Norfolk and Lord Howe Islands.

	A	B	C	D	E	F	G		A	B	C	D	E	F	G
Scaraphites	...	...	...	d	...	...	...	Aphodius	a	...	c	...	...	...	...
Macleayi	...	...	...	d	...	...	...	lividus	a	...	c	...	...	...	...
Clivina	a	...	c	...	...	...	...	Heteronychus	a	...	...	...	...	...	...
vagans	...	...	...	d	...	...	...	vulgivagus	...	...	...	d	...	...	...
sp. n.?	...	...	...	d?	...	...	...	Isodon	...	...	...	d	...	...	...
Chlaenius	a	...	...	...	...	...	g	noctis	...	...	...	...	...	f	...
peregrinus	...	...	...	d	...	...	g	Melobasis	...	b	...	...	...	...	...
Diaphoromerus	...	...	...	d	...	..	g	purpurascens	...	...	...	d	...	...	g
iridipennis	...	...	...	d	...	...	g	empyria	...	...	...	...	...	f	...
Lestignathus	...	...	...	d	...	...	...	Monocrepidius	a	...	c	...	...	...	...
fugax	...	...	...	...	...	f	...	striatus	...	...	...	d	...	...	g
Dyscolus	a	...	c	...	...	...	...	Telephorus	a	...	...	...	...	...	...
hilaris	...	...	...	...	...	f	...	apterus	...	...	...	...	...	f	...
Cybister	a	...	c	...	...	...	...	Cormodes	...	...	...	...	...	f	...
tripunctatus	a	...	...	...	...	...	...	Darwini	...	...	...	...	...	f	...
Sternolophus	a	...	...	...	...	...	...	Omadius	a	...	...	...	...	...	...
nitidulus	...	...	...	d	...	...	...	prasinus	...	...	...	d	...	...	...
Metoponcus	a	...	c	...	...	...	g	Hylecoetus	a	...	...	...	...	...	...
cyaneipennis	...	...	...	d	...	...	g	pervagus	...	...	...	d	...	...	...
fugitivus	..	...	...	...	...	f	...	Hopatrum	a	...	...	...	...	...	g
Creophilus	a	...	c	...	...	...	g	calvulum	...	...	...	...	...	f	...
erythrocephalus	...	b	...	...	...	...	g	Platydema	a	...	...	...	...	...	...
Hesperus	a	...	...	...	...	...	...	spicata	...	...	...	d	...	...	...
pacificus	...	...	...	...	...	f	...	Saragus	..	...	...	d	...	...	...
Phagonophana	...	...	c	...	...	...	...	exulans	...	...	...	...	...	f	...
Kingi	...	...	...	d	...	...	...	gulielmi	...	...	...	...	...	f	...
Platysoma	a	...	c	...	..	...	...	Nyctobates	a	...	...	...	...	...	...
sp. n.?	...	...	...	...	...	f?	...	sterrha	...	...	...	..	...	f	...
Saprinus	a	...	c	...	...	...	...	Meneristes	...	...	...	d	...	...	...
gayndahensis	...	...	...	d	...	...	...	vulgaris	...	...	...	...	...	f	...
Ostoma	a	...	...	...	...	...	...	curtulus	...	...	...	...	...	f	...
pudicum	...	...	...	...	...	f	...	Mordella	a	...	c	...	...	...	...
Neotrichus	a	...	...	...	...	...	...	australis	...	...	...	d	...	...	...
lucifugus	...	...	...	...	...	f	...	sp. n.?	...	...	...	...	...	f ?	...
Phormesa	...	b	...	...	...	...	...	Sphaeropterus	...	b	...	...	...	...	...
epitheca	..	...	...	...	...	f	...	barbipes	...	...	...	...	...	f	...
Gempylodes	a	...	...	...	...	...	...	Leptops	...	...	...	d	...	...	...
tmetus	...	...	...	d	...	...	...	Etheridgei	...	...	...	...	...	f	...
Pycnomerus	a	...	c	...	...	...	...	Orthorrhinus	...	b	...	...	...	...	...
moestus	...	...	...	...	...	f	...	lateralis	...	...	...	...	...	f	...
Dendrophagus	a	...	c	...	...	...	...	vagus	...	...	...	d	...	...	...
australis	...	...	...	d	...	...	...	Tranes	...	b	...	...	...	...	...
Cryptamorpha	a	...	c	...	...	...	...	insularis	...	...	...	...	...	f	...
Desjardinsii	a	...	c	...	...	...	...	Belus	...	...	...	d	...	...	...
*Lamprima	...	..	...	d	...	...	...	acrobeles	...	...	...	...	...	f	...
insularis	...	...	...	...	...	f	...	Isacantha	...	...	...	d	...	...	...
Figulus	a	...	..	...	...	...	...	inculta	...	...	...	...	...	f	...
regularis	...	b	...	...	...	...	...								

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* This genus extends as far as Waigiou, North-west New Guinea.

	A	B	C	D	E	F	G
Embaphiodes	...	...	...	...	...	f	...
pyxidatus	...	...	...	...	...	f	...
Imalithus	...	...	...	d	...	...	...
sp. n. ?	...	...	...	...	...	f ?	...
Euthyrrhinus	...	b	c	...	...	...	...
meditabundus	...	b	...	...	...	...	g
Aethreus	...	...	...	...	...	f	...
cicatricosus	...	...	...	...	...	f	...
Hybomorphus	...	...	...	...	...	f	...
melanosomus	...	...	...	...	...	f	...
Idotasia	...	b	c	...	...	...	...
montivaga	...	...	...	...	...	f	...
squamigera	...	...	...	...	...	f	...
Calandra	a	...	c	...	...	...	...
granaria	a	...	c	...	...	...	...
oryzæ	a	...	c	...	...	...	...
Aphanocorynes	...	...	...	d	...	...	...
procerus	...	...	...	...	...	f	...
Cossonus	a	...	...	...	...	...	...
lethargicus	...	...	...	...	...	f	...
Litocerus	a	...	...	...	...	...	...
Balli	...	...	...	...	...	f	...
Cnemoplites	...	...	...	d	...	...	...
Howei	...	...	...	...	...	f	...
Howea	...	...	...	...	...	f	...
angulata	...	...	...	...	...	f	...
Phacodes	...	...	...	d	...	...	...
obscurus	...	...	...	d	...	...	...
Ceresium	a	...	c	...	...	...	g
simplex	...	b	c	...	...	...	g
sp. ?	...	...	...	d ?	...	...	...
Hemesthocera	...	...	...	d	...	...	...
flavilinea	...	...	...	d	...	...	...
Clytus	a	...	c	...	...	...	...
australis	...	b	...	...	...	...	...
Blax	...	...	...	...	...	f	...
Wollastoni	...	...	...	...	...	f	...
Xyloteles	...	b	...	...	...	...	...
segrex	...	...	...	...	...	f	...
Somatidia	...	...	...	...	e	...	...
pulchella	...	...	...	...	...	f	...
capillosa	...	...	...	...	...	f	...
aranea	...	...	...	...	...	f	...
Monohammus	a	...	...	...	...	...	...
fistulator	...	b	...	...	...	...	...
fasciatus	...	b	...	...	...	...	...
Zygocera	a	...	...	...	...	...	...
bifasciata	...	b	...	...	...	...	...
Sybra	a	...	...	...	...	...	...
sp. n. ?	...	...	...	...	...	f ?	...
Chaetocnema	a	...	...	...	...	...	...
sp. n. ?	...	...	...	...	...	f ?	...
Coccinella	a	...	c	...	...	...	...
transversalis	a	...	...	...	...	...	...

COLEOPTERA.

In the following list the species obtained by Mr. Etheridge's party are distinguished by an asterisk.

CARABIDÆ.

*SCARAPHITES MACLEAYI, *Westw.*

Scaraphites Macleayi, Westwood, Arcana Entom., 1842, I, p. 157.

The occurrence of a typical Australian species of *Scaraphites*, a genus of large wingless ground beetles, in Lord Howe Island, is particularly interesting in view of the limited distribution of the group. A considerable number of specimens, which were found beneath logs, &c., have been obtained by the collectors who have visited the island.

CLIVINA VAGANS, *Putz.*

Clivina vagans, Putzeys, Stett. Ent. Zeit., 1866, p. 38.

Several specimens, which only appear to differ from this species in their somewhat larger size (9½ mm.), and rather less narrowed prothorax. *C. vagans* is found in Tasmania and also in South Australia.

CLIVINA, sp.

A small copper-coloured species.

*CHLÆNIUS PEREGRINUS, *Laferté.*

Chlænius peregrinus, Laferté, Ann. Soc. Ent. France, 1851, p. 247.

Common in Norfolk Island as well as throughout the Australian continent.

*DIAPHOROMERUS IRIDIPENNIS, *Chaud.*

Diaphoromerus iridipennis, Chaudoir, Bull. Mosc., 1843, p. 405.

This species is common in Queensland, and also occurs in Norfolk Island.

*LESTIGNATHUS FUGAX, sp. nov.

Elongate-ovate, dark piceous, shining, sometimes with a bluish tinge; elytra strongly striate, the interstices rather narrow, plain; antennæ (except the basal joint) and palpi reddish testaceous; legs rufo-piceous.

Head narrow; eyes rather prominent. Antennæ more than two-thirds the length of the body, the basal joint piceous. Prothorax narrowed behind, with a distinct median line; the sides rounded in front; posterior angles rounded. Elytra oblong-ovate, very slightly contracted before the middle, strongly and regularly striate, the interstices narrow and smooth, the second stria, on each side, with an obscure puncture before the middle; sides slightly sinuate before the apex. Legs rather long. Length 13 mm.

Differs from the Tasmanian *Lestignathus cursor*, Er., to which it is very nearly allied, by its more strongly and closely striated elytra, and by having the prothorax rather less narrowed behind. The head is a little smaller, and the interstices, besides being narrower, have a tendency to approach one another both in front and behind.

*DYSCOLUS HILARIS, sp. nov.

Elongate-ovate, piceous, shining; head rather broad, moderately convex; prothorax transverse, the margins broad; elytra rather strongly striate, the interstices broad and smooth; antennæ reddish testaceous; legs pitchy red.

Eyes moderately prominent. Antennæ about half as long as the body. Prothorax considerably narrowed behind, with a distinct median line, and a large foveolate impression on each side at the base; sides rounded for nearly half their length, then narrowed to the base; the posterior angles rounded. Elytra oblong-ovate, strongly and regularly striate, the third stria, with an obscure puncture near the base; the second stria with two obscure punctures, one near the middle, the other towards the apex; sides rounded, slightly sinuate before the extremity. Length 10-11 mm.

Summit of Mount Ledgbird (2,500 feet), and throughout the island; appears to be a common species.

Allied to *Dyscolus dilatatus*, Er., but with the head more convex, and the prothorax broader and more strongly margined, &c. The basal joint of the antennæ is also proportionately longer.

DYTISCIDÆ.

CYBISTER TRIPUNCTATUS, *Oliv.*

Dytiscus tripunctatus, Olivier, Ent. 1795, III, p. 14, pl. 3, fig. 24; Sharp, Trans. Royal Dubl. Soc., (2) II, p. 727 (1882)—*Cybister gayndahensis*, Macleay, Trans. Ent. Soc., N.S.W., 1871, II, p. 127.

A single specimen of this species, which is found in Australia, and almost universally throughout the tropical and sub-tropical regions of the old world, was recently obtained in Lord Howe Island by Mr. Langley.

HYDROPHILIDÆ.

*STERNOLOPHUS NITIDULUS, *Macl.*

Sternolophus nitidulus, Macleay, Trans. Ent. Soc. N.S.W., 1871, II., p. 129.

I have seen specimens from fresh-water pools near Mount Gower, which agree in every respect with the type of this Queensland species.

STAPHYLINIDÆ.

*METOPONCUS CYANEIPENNIS, *Macl.*

Leptacinus cyaneipennis, Macleay, Trans. Ent. Soc. N.S.W., II, p. 137 (1871), *M. cyaneipennis*, Olliff, Proc. Linn. Soc. N.S.W., (2) II, p. 477 (1887).

Apparently not uncommon.

METOPONCUS FUGITIVUS, sp. nov.

Elongate, pitchy red, shining, finely and sparingly pubescent; elytra much shorter than the prothorax, reddish piceous; abdominal segments dark pitchy red; legs reddish testaceous.

Head large, much longer than broad, very slightly narrowed in front, truncate behind, extremely finely and very sparingly punctured, a few larger but somewhat obscure punctures on the disc, two behind the eye, one near the posterior angle, and two on the posterior margin; the frontal sulci oblique, moderately conspicuous; the inner orbital margin of the eye impressed. Antennæ reddish testaceous, second joint slightly longer than broad, joints 3-10 transverse. Prothorax somewhat convex, a little narrowed posteriorly, sinuate behind the middle, sparingly and extremely finely punctured, with four moderately distinct dorsal punctures, two on each side of the middle; anterior and posterior angles rounded. Scutellum pitchy. Elytra decidedly shorter than the prothorax, a little longer than broad, almost piceous posteriorly, rather paler near the base, very finely and sparingly punctured, with a short impression on each side of the scutellum at the base. Abdomen finely and sparingly punctured. Length 6½ mm.

Summit of Mount Ledgbird (2,500 feet).

Easily distinguished from *Metoponcus cyaneipennis*, Macl., by its short elytra and obscure colouring.

*CREOPHILUS ERYTHROCEPHALUS, *Fabr.*

Staphylinus erythrocephalus, Fabricius; Olliff, Proc. Linn. Soc. N.S.W., (2) II, p. 492 (1887).

Widely distributed throughout Australia, and extending as far as Norfolk Island, New Caledonia, Tonga, &c.

HESPERUS PACIFICUS, *Oll.*

Hesperus pacificus, Olliff, Proc. Linn. Soc. N.S.W., (2) II, p. 509 (1887).

Two specimens found under dead leaves.

One or two species of this family—chiefly belonging to the later tribes of the Staphylininæ—which are known to me from Lord Howe Island, are not recorded here, as they cannot be satisfactorily determined without an examination of the Australian species, but a detailed account of them will be included in the forthcoming part of my "Revision of the Staphylinidæ of Australia," now in course of publication in the "Proceedings of the Linnean Society of New South Wales."

SCYDMENIDÆ.

PHAGONOPHANA KINGI, *King.*

Phagonophana Kingi, King, Trans. Ent. Soc. N.S.W., I, p. 92, pl. 5, figs. A 1-4 (1864).

Several badly-preserved specimens of this interesting species, which is known to range from Albany, West Australia, to Queensland.

HISTERIDÆ.

PLATYSOMA, sp.

A single specimen.

SAPRINUS GAYNDAHENSIS, *Macl.*

Saprinus gayndahensis, Macleay, Trans. Ent. Soc. N.S.W., II, p. 158 (1871).

Two or three specimens of a *Saprinus*, which were found *in stercore*, agree very well with this species.

TROGOSITIDÆ.

OSTOMA PUDICUM, sp. nov.

Plate VI, f. 7.

Ovate, depressed, black, somewhat shining; prothorax very coarsely punctured on the disc, densely clothed at the sides with light brown appressed scales; elytra at the base broader than the prothorax, thickly covered with scales, each with seven costæ composed of bead-like elevations.

Head transverse, strongly and closely punctured in front, rather less strongly punctured behind. Antennæ eleven-jointed, ferruginous, the club distinctly three-jointed. Prothorax deeply emarginate in front, the sides rounded anteriorly, abruptly narrowed and indistinctly serrate behind the middle. Scutellum transverse, rounded behind, irregularly punctured. Elytra about twice as long as the head and prothorax together, slightly narrowed behind, with broad margins, the costæ moderately raised, shining, interrupted at short intervals by slightly impressed punctures, the interstices flat, the third, fourth, and fifth, considerably broader than the others; underside dark ferruginous, shining; sterna coarsely punctured; abdomen finely and closely punctured. Legs dark ferruginous. Length 8—11 m.m.

Summit of Mount Ledgbird (2,500 feet); also found on the low-lying land.

The species described above agrees with *Ostoma* in form and all essential points of structure; the prosternum, however, is much broader behind the coxæ, the margins of the elytra are more dilated, and the form of the elytral costæ is very different. In spite of these differences, I think the species must be retained in the genus, unless a new one is established for its reception. A variety occurs in which the disc of the prothorax is tinged with bronze.

COLYDIIDÆ.

NEOTRICHUS LUCIFUGUS, sp. nov.

Elongate, parallel-sided, dark fuscous, thickly covered with erect fulvous setæ; prothorax distinctly longer than broad, granulose, sides parallel; elytra strongly seriate-punctate.

Head broadly transverse, strongly rugulose; eyes very prominent. Antennæ dark reddish testaceous, with the penultimate joint very broad. Prothorax broader than the head, rather thickly covered with coarse granules and short erect setæ; anterior angles prominent; the sides explanate and clothed with a row of outstanding setæ. Elytra slightly narrower in front than behind, with series of coarse punctures; the interstices narrow and bearing erect setæ; near the humeral angles, which are somewhat prominent, the elytra have a tuberculate appearance. Underside dull, rather strongly and sparingly punctured. Legs fuscous; the tibiæ with conspicuous setæ on the outer margins. Length 4—5½ mm.

There can, I think, be no doubt as to the identity of this species with *Neotrichus*, recently characterized by Dr. Sharp. It is nearly allied to his *N. serratus* (Journ. Linn. Soc., XIX, p. 117, pl. 6, fig. 1, 1885), which it resembles in having the surface granulose, and the sides of the prothorax parallel; but it may be distinguished by its less coarse setæ. The genus would appear to have a wide distribution, as it is now known from Japan, Ceylon, and Lord Howe Island.

PHORMESA EPITHECA, sp. nov.

Elongate, depressed, fuscous; prothorax with the margins luteous, strongly bicostate, with a strongly-marked elevation on each side in front, the sides regularly rounded; elytra luteous, marked with fuscous, each with five costæ.

Head densely and moderately strongly rugulose-punctate. Antennæ pitchy red, with a very distinct two-jointed club. Prothorax about one-third broader than long, somewhat narrowed in front, very strongly and closely rugulose-punctate between the costæ, much less strongly punctured behind the costæ. Scutellum very minute. Elytra about one and a half times as long as the head and prothorax together, parallel-sided for two-thirds of their length, then gradually rounded to the apex, irregularly marked with inconspicuous fuscous spots; each elytron with five moderately-elevated costæ, the insterstices broad and furnished with a double series of indistinct punctures. Underside opaque, sterna rugulose, abdominal segments finely punctured. Legs pitchy red; tibiæ paler. Length 5½ mm.

Summit of Mount Ledgbird (2,500 feet.)

The bicostate prothorax and ample size of this species will distinguish it from the other members of this genus, which appears to have a wide range in the Malay Archipelago.

GEMPYLODES TMETUS, sp. nov.

Very narrow and elongate, opaque black; prothorax rugulose-punctate, with a deeply-impressed median line, and an elevated ridge on each side of the middle; elytra bicostate, with rows of deeply-impressed punctures.

Head rather strongly and moderately closely punctured; eyes not very prominent. Antennæ pitchy, gradually thickening towards their extremity, the first two joints short, the third longer than any of the succeeding ones except the apical, which is pointed at the tip. Prothorax very elongate, narrowed posteriorly and slightly constricted behind the middle, very closely and irregularly punctured; the median channel more deeply impressed in the middle than in front or behind. Scutellum very small, with a few minute punctures. Elytra about twice as long as the head and prothorax together, very slightly narrowed in the middle, strongly seriate-punctate, the interstices, except the second and fourth, which are elevated into conspicuous carinæ, almost obliterated; the suture slightly raised; the apex of each elytron emarginate within. Underside evenly and not very closely punctured. Legs reddish testaceous. Length 6½-9 mm.

Near the foot of Mount Ledgbird, under bark; also found at Maryborough, Queensland.

Allied to *Gempylodes macer*, Pasc., and *G. Lewisi*, Sh., but readily distinguished by its densely punctured and ridged prothorax.

PYCNOMERUS MOESTUS, sp. nov.

Elongate, narrow, depressed, shining; antennæ with a distinct two-jointed club; head and prothorax piceous, elytra pitchy red, the latter with strongly-punctured striæ.

Head rather strongly and closely punctured, with two impressions between the antennæ; eyes not very prominent. Antennæ pitchy red, moderately robust. Prothorax slightly longer than broad, a little narrowed posteriorly, punctuation coarse and dense, somewhat confused on the disc; the anterior angles not prominent; sides slightly rounded. Scutellum very minute, impunctate. Elytra rather strongly punctate-striate, the interstices narrow, slightly raised and smooth; humeral angles not prominent. Legs pitchy red. Length 3½-4½ mm.

Summit of Mount Ledgbird (2,500 feet).

Closely related to the New Zealand *Pycnomerus longulus*, Sh.,† a species which should be added to the Australian list, as I have seen specimens from the Pine Mountains, Queensland. *P. moestus* may be known by its more strongly-punctured prothorax, which lacks even a vague discal depression, and its strongly-punctured elytral striæ and raised interstices.

CUCUJIDÆ.

Dendrophagus australis, *Erich.*

Dendrophagus australis, Erichson; Olliff, Proc. Linn. Soc. N.S.W., X, p. 218 (1885).

A common and widely-distributed species which is found throughout Australia.

Cryptamorpha Desjardinsii, *Guér.*

Psammœcus Desjardinsii, Guérin; Olliff, Proc. Linn. Soc. N.S.W., X, p. 220 (1885).

This species is frequently found on the banana trees, but it is probably an introduced species, as it is almost cosmopolitan in its range, being one of those species which are carried about in articles of commerce.

LUCANIDÆ.

*Lamprima insularis, *Macl.*

Lamprima insularis, Macleay, Proc. Linn. Soc. N.S.W, X, p. 137 (1885).

This species appears to be peculiar to the island, where the males are sometimes found in great numbers clinging to the limbs of low-growing shrubs and flying in the sunshine. The females are not nearly so abundant. Both sexes vary greatly in colour, some being almost violet or pale-bluish green, but the commonest form is of the ordinary brassy hue.

*Figulus regularis, *Westw.*

Figulus regularis, Westwood, Ann. Sc. Nat., (2) I, p. 120 (1834).

A species of wide distribution on the Australian continent; also found in New Guinea.

SCARABÆIDÆ.

Aphodius lividus, *Oliv.*

Aphodius lividus, Olivier, Ent. I, p. 86, pl. 26, fig. 222.

This species is cosmopolitan in its range.

DYNASTIDÆ.

Heteronychus vulgivagus, sp. nov.

Elongate, dark piceous, shining, moderately convex; head with two central tubercles; prothorax exceedingly finely and very sparingly punctured; elytra strongly striate-punctate in the middle; pygidium irregularly punctured at the base.

Head narrowed and bisinuate in front, transversely rugulose; the median carina indistinct, with a strongly-developed tubercle on each side of the middle. Antennæ bright castaneous. Prothorax about one-third broader than long, slightly narrowed in front, finely margined; the anterior angles acute, the posterior rounded. Scutellum triangular, smooth. Elytra with eight rows of large, more or less impressed, punctures, of which the four central rows are abbreviated posteriorly; the second, fifth, and seventh rows more strongly impressed than the others; the apex of each elytron very strongly and irregularly punctured. Underside piceous; the sterna moderately closely covered with long erect pubescence. Legs dark castaneous; the anterior tibiæ obtusely tridentate, the others bicarinate. Length 14—16 mm.

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† Trans. Royal Dubl. Soc., (2) III, p. 389, pl. 12, fig. 21 (1886).

Low-lying lands, at light; also found in the vicinity of Sydney, New South Wales.

ISODON NOCTIS, sp. nov.

Elongate-ovate, rather robust, castaneous, shining, very convex; prothorax broadly transverse, smooth; elytra rather strongly striate-punctate, the striæ abbreviated posteriorly; pygidium finely and irregularly punctured at the base.

Head narrowed in front, rather strongly rugulose in front of the median carina, which is moderately distinct, behind strongly and irregularly punctured, especially near the sides; the base smooth. Antennæ castaneous. Prothorax broadly transverse, strongly convex, somewhat narrowed in front; the sides strongly rounded; the posterior margin somewhat impressed on each side of the middle. Scutellum smooth. Elytra with the sutural stria finely punctured and moderately strongly impressed, the punctures of the discal striæ exceedingly coarse and somewhat irregular, the interstices moderately broad, a broad impunctate interval between the sutural and the first discal stria; the apex of each elytron moderately strongly and very sparingly punctured. Underside pale castaneous; the sterna thickly clothed with long silky pubescence. Legs castaneous; tibiæ and tarsi inclining to pitchy; anterior tibiæ tridentate, the others bicarinate. Length 16—20 mm.

This species is evidently allied to *Isodon lævicollis*, Macl., but may be separated at once by the presence of the broad impunctate intervals on the elytra between the sutural and the discal striæ, by having the sides almost free from punctures, and the head smooth at the base. In *I. laevicollis* there is an irregular row of punctures midway between the sutural and the first discal stria, and the striæ themselves are continued until they reach the side; the punctures in this species, although more irregular and much more numerous, are not nearly so deep as in *I. noctis.*

BUPRESTIDÆ.

MELOBASIS PURPURASCENS, *Fabr.*

Melobasis purpurascens, Fabricius, Syst. El., II, p. 217—*M. purpureosignata*, Lap. and Gory, Mon., pl. 2, fig. 9.

This species is not uncommon in Australia; it is also found in Norfolk Island.

MELOBASIS EMPYRIA, sp. nov.

Coppery green, shining; prothorax bright coppery, purplish on the disc; scutellum fiery copper; elytra coppery, with purple reflexions, irregularly striate-punctate, the third and fourth interstices obviously raised.

Head nearly flat in front, coarsely and very densely punctured. Prothorax at the base more than one-third broader than long, considerably narrowed in front, rather strongly and sparingly punctured on the disc, the punctuation at the sides much stronger and denser, the anterior margin slightly produced in the middle, its angles produced and rounded; the sides rounded; the posterior margin nearly straight. Scutellum excessively finely punctured. Elytra about twice as long as broad, coppery, inclining to fiery near the suture and about the middle, rather strongly and irregularly striate-punctate; the sides straight and nearly parallel for about two-thirds of their length, then denticulate, and narrowed to the apex. Underside bright coppery green, the sterna strongly and not very closely punctured, the abdomen with the punctuation somewhat obsolete. Legs coppery green, finely punctured, the tarsi darker. Length 12 mm.; greatest width 4½ mm.

A distinct species of *Melobasis*, evidently belonging to the *M. nervosa* group.

ELATERIDÆ.

MONOCREPIDIUS STRIATUS, *Macl.*

Monocrepidius striatus, Macleay, Trans. Ent. Soc. N.S.W., II, p. 252 (1872).

This species is found in Queensland, and also in Norfolk Island.

LAMPYRIDÆ.

*TELEPHORUS APTERUS, sp. nov.,

Plate VI, f. 3.

Moderately robust, dull steel-blue, somewhat shining, clothed with very fine dusky pubescence; prothorax very slightly longer than broad, the posterior third bright testaceous; elytra abbreviated, finely punctured and coriaceous; abdomen elongate, segments 1–5 margined with testaceous posteriorly.

Head very finely punctured. Antennæ fuscous, the second joint very small. Prothorax considerably broader than the head, scarcely narrowed behind, extremely finely and irregularly punctured, the anterior two-thirds steel-blue, the posterior third testaceous; the sides sub-parallel, all the angles rounded; an indistinct median line. Scutellum truncate behind, extremely finely punctured. Elytra narrowed anteriorly, rounded behind, not reaching beyond the third abdominal segment, finely and irregularly punctured, the suture slightly raised; the inner apical angles rounded. Abdomen ample, very finely punctured, the first to fifth, and sometimes the sixth, segments broadly bordered with testaceous. Underside blue-black, the abdominal segments bordered with testaceous. Legs blue-black, finely pubescent. Length 13–18 mm.

Abundant throughout the island on low-growing shrubs; also found on the summit of Mount Ledgbird. The female is noticeably larger than the male, and has the abdomen proportionally longer and broader; both sexes are apterous. A variety occurs in which the first five abdominal segments are yellow, with the anterior margins narrowly bordered with blue-black.

This species is one of the most interesting of the endemic Coleoptera in that it shows a marked modification of a type of universal distribution. In spite of the abbreviated elytra, and the absence of wings, it does not differ materially from *Telephorus*, and I therefore venture to associate it with that genus. Perhaps subsequently it will be necessary to separate it under another name.

CLERIDÆ.

CORMODES DARWINI, *Pasc.*

Cormodes Darwini, Pascoe, Journal Entom., I, p. 47, pl. 2, fig. 8 (1860).

A single specimen of this remarkable wingless species, found near Mount Gower, under bark, is now in the collection of the Australian Museum.

OMADIUS PRASINUS, *Westw.*

Omadius prasinus, Westwood, Proc. Zool. Soc. Lond., 1852, p. 53, pl. 26, fig 2.

This widely-distributed Australian insect appears to be tolerably common.

LYMEXYLONIDÆ.

Hylecoetus pervagus, sp. nov.

Elongate, clothed with short griseous pubescence, head and prothorax piceous, the latter longer than broad, finely and densely rugulose-punctate; elytra ferruginous, very finely and closely punctured, each with two feebly elevated costæ.

Head rather large, finely rugulose between the eyes, which are very large, prominent, and contiguous in front. Antennæ reddish testaceous, clothed with fuscous pubescence, the terminal joint elongate, acuminate at the extremity. Prothorax decidedly longer than broad, narrowed behind, densely and irregularly punctured, finely and closely pubescent, the pubescence more distinct near the sides; the anterior margin arcuate, the angles rounded; sides with a slight prominence in the middle. Scutellum longer than broad, finely rugulose-punctate. Elytra almost parallel-sided, finely and very-closely punctured, rounded behind; each elytron with two feeble linear elevations on the disc, and a third very indistinct but similar elevation near the side. Underside reddish testaceous, clothed with fine pubescence, and very finely and densely punctured. Legs reddish testaceous. Length 15–21 mm.

A single specimen dug out of a fallen log; also found at Kiama, in the Illawarra district of New South Wales.

Apparently a very distinct species differing from the few known Eastern forms in having the prothorax, which is without a central furrow, decidedly longer than broad. Its nearest ally is probably *Hylecoetus javanicus*, Chev.,† a species which ranges from Sumatra to North-west New Guinea.

TENEBRIONIDÆ.

*Hopatrum calvulum, sp. nov.

Elongate ovate, moderately convex, dull opaque black, very sparingly clothed with extremely fine fulvous pubescence; prothorax extremely finely rugulose; elytra very obscurely punctate-striate, the intervals very minutely rugulose.

Head broadly transverse, very finely rugose punctate; the sides produced in front of the eyes. Antennæ ferruginous. Prothorax strongly emarginate in front; the sides strongly rounded; the posterior margin bisinuate. Scutellum transverse, rounded behind, finely punctured at the base. Elytra sub-parallel for two-thirds of their length, then rounded to the apex, obscurely punctate-striate; the interstices broad, nearly flat, and minutely rugulose. Underside somewhat shining, moderately closely and irregularly punctured. Legs piceous, tibia and tarsi inclining to ferruginous. Length 6–7 mm.

Allied to *Hopatrum Mastersi*, Macl., and the Norfolk Island *H. insulanum*, Oll.,‡ but differs in its smoother appearance and more obscurely striate elytra. To the naked eye its surface appears to be almost smooth, but when examined under a powerful lens it is seen to be minutely rugulose or roughened.

Platydema spicata, sp. nov.

Ovate, pitchy black, shining, moderately convex, prothorax extremely finely and rather closely punctured; elytra finely punctate-striate, the striæ not extending to the apex, the interstices broad and slightly raised.

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† Cf. Fairmaire, Notes Leyd. Mus., IX, p. 155 (1887).

‡ Proc. Linn. Soc. N.S.W., (2) II, p. 1006, (1887).

Head rounded in front, extremely finely punctured; the male with two horizontal pointed horns above the eyes; the female with two similarly-placed processes, which are blunt at the extremity. Antennæ dark ferruginous, finely pubescent. Prothorax at the base about twice as broad as long, extremely finely and rather closely punctured, with two indistinct oblique impressions behind, one on each side of the middle. Scutellum broadly transverse, extremely finely punctured. Elytra strongly convex, finely punctate-striate, the striæ not very deeply impressed and abbreviated posteriorly, the interstices broad, slightly raised, and extremely finely and rather sparingly punctured. Underside pitchy black, somewhat shining, finely and sparingly punctured. Legs dark ferruginous, tarsi paler. Length 6—6½ mm.

Except as regards the development of the processes on the head, the sexes of this species do not differ perceptibly. It appears to be very distinct from the described Australian forms; but I have seen a *Platydema* from Bowen, Queensland, and Kiama, New South Wales, which agrees with it in every point except that the elytral striæ are less strongly marked.

*SARAGUS EXULANS, *Pasc.*

Saragus exulans, Pascoe, Journal Entom., II, p. 466 (1866); Macleay, Proc. Linn. Soc. N.S.W., (2) II, p. 667 (1887).

An abundant species, which varies from 10 to 14 mm. in length.

*SARAGUS GULIELMI, sp. nov.

Elongate-ovate, moderately convex, pitchy black, somewhat shining; prothorax finely and densely rugulose punctate; elytra closely and rather strongly lineate-punctate.

Head transverse, rather finely rugulose punctate; clypeus with the sides sloping, scarcely emarginate in front. Antennæ dark ferruginous. Prothorax transverse, considerably narrowed and broadly emarginate in front, finely and closely rugulosely punctured on the disc, more evidently rugulose near the sides; the lateral margins broad and not clearly defined. Scutellum very finely and sparingly punctured. Elytra rather strongly and somewhat irregularly lineate-punctate, the punctures less impressed posteriorly, the suture slightly raised. Underside pitchy black, somewhat shining; abdominal segments minutely punctured and finely aciculate at the sides. Legs pitchy; the tibia and tarsi ferruginous. Length 14—17mm.

Summit of Mount Ledgbird (2,500 feet), under stones; also found on the low-lying lands.

This species may be distinguished from *Saragus exulans*, with which it has hitherto been confused in more than one Sydney collection, by its comparatively longer and much more strongly punctured prothorax, and its more distinctly punctured elytra. In form it is more elongate, and usually it is larger in stature. This species, which, like the last, is probably endemic, is dedicated to the Hon. William Macleay, M.L.C., who has recently published an exhaustive review of the species of *Saragus* and the allied genera of Helæinæ.

*NYCTOBATES STERRHA, sp. nov.

Plate VI, f. 1.

Elongate, robust, black, shining, strongly convex; prothorax broadly transverse, slightly narrowed behind, with a distinct median line; elytra very broad behind, narrowed in front, strongly punctate-striate, the interstices broad and convex.

Head and clypeus rather finely and sparingly punctured, the latter with an indistinct transverse impression in the middle. Antennæ dark ferruginous, reaching to the middle of the prothorax, the third joint evidently longer than the succeeding ones. Prothorax finely and sparingly punctured; anterior angles deflexed and rounded; the sides slightly narrowed behind the middle; posterior angles nearly rectangular, very slightly produced; median line strongly impressed posteriorly. Scutellum rounded behind, very finely and irregularly punctured. Elytra at the base considerably broader than the prothorax, widening for two-thirds of their length, then rounded to the apex, the striæ are distinctly punctured, and the interstices broad and very convex. Underside black, highly polished; first three segments of abdomen finely and irregularly punctured; sterna and last two abdominal segments extremely finely and irregularly punctured. Legs pitchy black, shining, tarsi clothed with fulvous pubescence. Length 23—25 mm.; greatest width 10—11 mm.

As far as I can judge from the description, the above resembles *Promethis lethalis*, Pasc., from Queensland, in *facies*, but in that species the prothorax is said to be more contracted behind, and the elytral punctures indistinct as compared with *P. angulata*, two points in which this species certainly does not agree. In *N. sterrha* the prothorax is more rounded in front and less narrowed behind, and the punctures of the elytral striæ are more distinct, although, if anything, less strongly impressed. I have little doubt as to the generic position of this species, which is probably not confined to Lord Howe Island, as it answers very well to Lacordaire's diagnosis of *Nyctobates*; but I may add, that the characters of the genera in this division of the heteromerous beetles are generally so unsatisfactory that their identification is a matter of the greatest difficulty, to a student working at a distance from accurately-named collections. If, perchance, any errors of generic identification should occur in the species described in this paper, I trust that the presence of lithographed figures will obviate any serious confusion.

*MENERISTES VULGARIS, sp. nov.

Plate VI, f. 6.

Elongate, black, shining, moderately convex; prothorax with the posterior angles very slightly produced; elytra rather finely punctate-striate, the interstices extremely finely punctured.

Head finely and very densely punctured in front, not so densely punctured behind; clypeal suture indistinct. Antennæ dark ferruginous. Prothorax broadly transverse, slightly narrowed both in front and behind, finely and not very closely punctured, the anterior angles rounded, the sides regularly rounded, the posterior angles slightly produced. Scutellum rounded behind, minutely punctured. Elytra at the base rather broader than the prothorax, widening for two-thirds of their length, then arcuately rounded to the apex, finely punctate-striate, the interstices broad, slightly raised, and minutely punctured. Underside pitchy black, somewhat shining, minutely punctured. Legs pitchy, tarsi paler. Length 12—15 mm.

Summit of Mount Ledgbird (2,500 feet); also found abundantly on the low-lying lands.

This species has many characters in common with *Meneristes servulus*, Pasc., but its more convex form, rounded prothorax, and finely punctured elytral striæ will at once distinguish it. The remarks appended to the last description, with regard to the insufficiency of the generic descriptions in this group, apply with special force to *Meneristes* and its allies. The forms described here agree with *Meneristes*, inasmuch that the tibiæ are spurred and the femora thickened, but the basal joints of the antennæ are more elongate than is usual in that genus.

*MENERISTES CURTULUS, sp. nov.

Elongate-ovate, black, shining, rather convex; prothorax rounded in front, the posterior angles scarcely produced; scutellum very small; elytra moderately strongly striate-punctate, the interstices broad, minutely and sparingly punctured.

Head finely and moderately closely punctured, rather smooth in the middle, finely wrinkled at the sides; clypeal suture nearly straight, strongly impressed; eyes very prominent. Antennæ ferruginous. Prothorax at the base not quite one-third broader than long, slightly narrowed both in front and behind, finely and not very closely punctured. Scutellum minute, triangular. Elytra at the base rather broader than the prothorax, arcuately narrowed from behind the middle to the apex, moderately strongly punctate-striate, the punctures placed at short intervals in the striæ, which are moderately impressed. Underside pitchy black, shining; the abdomen finely and sparingly punctured. Legs pitchy, tarsi ferruginous. Length 8—10 mm.

At once separable from the preceding species by its comparatively short, ovate form, broad, convex prothorax, and minute scutellum. It appears to be an abundant species.

MORDELLIDÆ.

MORDELLA AUSTRALIS, *Bois.*

Mordella australis, Boisduval, Voy. Astrob., II, p, 289 (1835).

A single specimen.

MORDELLA, sp.

An abraded example of a species nearly allied to *Mordella* 14-*maculata*, Macl.

CURCULIONIDÆ.

SPHAEROPTERUS BARBIPES, *Saund. & Jek.*

Isomerinthus barbipes, Saunders & Jekel, Ann. Soc. Ent. France, (3) III, p. 293, pl. 15, fig. 3 (1855).

This species is unknown to me.

*LEPTOPS ETHERIDGEI, sp. nov.

Plate VI, f. 5.

Elongate ovate, piceous, densely covered with griseous scales; rostrum long, depressed in the middle; prothorax rugulose, narrowed in front; elytra ample, seriate-punctate, obtusely bi-tuberculate posteriorly.

Head thickly covered with scales, those near the sides inclining to ochraceous; rostrum about as long as the prothorax. Eyes narrow, vertical. Antennæ rather long, the scape closely scaled, funiculus finely pubescent. Prothorax decidedly broader than long, moderately strongly rugulose, the scales inclining to ochraceous at the sides, an obscure median carina which is effaced anteriorly. Scutellum distinct, pointed behind. Elytra about two and a half times as long as the prothorax, somewhat flattened above, moderately strongly seriate-punctate, the punctures widely separated and somewhat irregular, the interstices broad and slightly raised, the third interstice slightly and the sixth rather strongly elevated posteriorly, giving the elytra a bi-tuberculate appearance. Underside and legs moderately closely scaled and finely pubescent. Length $12\frac{1}{2}$ mm.; greatest width $6\frac{1}{2}$ mm. †

A single example of this very distinct species was in the collection obtained by the party which recently visited Lord Howe Island under the charge of my colleague, Mr. R. Etheridge, junr.

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† In the case of the Rhynchophorous beetles the measurements are exclusive of the rostrum.

*ORTHORRHINUS LATERALIS, *Pasc.*

Orthorrhinus lateralis, Pascoe, Ann. Mag. Nat. Hist., (5) IX, p. 381 (1882).

Evidently not uncommon, as it occurs in most of the collections I have seen from the island.

*ORTHORRHINUS VAGUS, sp. nov.

Sub-cylindrical, piceous, thickly covered with ashy gray and ochraceous scales; prothorax moderately strongly tuberculate, with two erect fascicles in front; elytra with irregular rows of tubercles, and three discal tufts.

Head covered with ochraceous scales; rostrum nearly straight, decidedly longer than the prothorax, finely and rather closely punctured. Antennæ moderately long; the funiculus with the first joint almost as long as the four succeeding ones together, the second joint elongate, the third to sixth about as broad as long. Prothorax rather longer than broad, strongly constricted in front, the tubercles inconspicuous near the anterior margin, the two marginal tufts composed of erect pubescence and scales. Scutellum transverse, rounded behind, thickly covered with scales. Elytra considerably more than twice as long as the prothorax, parallel-sided, with rows of impressed punctures between irregular series of tubercles, those in the middle being the most conspicuous; each elytron with a small tufted eminence near the base, a large tuft behind the middle, and a third on the preapical callus, which is not very prominent. Underside thickly clothed with ochraceous and scattered dusky-white scales. Legs with the tibiæ bisinuate internally. Length, 11—13 mm.

This species, which is also found at Kiama, in the Illawarra district of New South Wales, evidently belongs to the *O. cylindrirostris* group of the genus *Orthorrhinus*. The antennæ are inserted at rather more than a third of the length of the rostrum from the apex, and the basal half of the elytra is, in most specimens, decidedly lighter in colour than the apex, owing to the preponderance of the gray scales.

TRANES INSULARIS, *Pasc.*

Tranes insularis, Pascoe, Ann. Mag. Nat. Hist., (4) XIII, p. 387 (1874).

Summit of Mount Ledgbird (2,500 feet); also found on the low-lying lands. It appears to be an uncommon species.

BELUS ACROBELES, sp. nov.

Plate VI, f. 2.

Elongate, fuscous, somewhat shining, sparingly clothed with fine gray pubescence; rostrum ferruginous and smooth beyond the point of insertion of the antennæ; prothorax finely rugose, the sides and the median line clothed with ochraceous pubescence.

Head moderately strongly punctured between the eyes, which are large and prominent, finely punctured at the base; rostrum roughly punctured at the base. Antennæ ferruginous, the second joint about half as long as the first, the third and fourth a little shorter than the first, fifth to tenth somewhat thickened, gradually increasing in length, the apical joint pointed at the extremity. Prothorax considerably narrowed and somewhat constricted in front, slightly impressed on each side in the middle, the median line distinct, sparingly clothed with fine ochraceous pubescence; the sides thickly clothed with ochraceous pubescence. Scutellum broadly transverse. Elytra strongly produced posteriorly, somewhat flattened on the disc, strongly punctured, the punctures arranged in rows near the suture, rugulose near the sides.

Underside sparingly clothed with ashy scales in the middle, the sterna and abdominal segments with ochraceous scales at the sides. Legs finely pubescent. Length 10—11 mm.

Appears to be distinct from any of the described species of this peculiarly Australian genus.

ISACANTHA INCULTA, sp. nov.

Elongate, greatly narrowed in front, piceous, somewhat shining, covered with fine slaty gray pubescence; the prothorax and elytra finely granulate, the former only slightly constricted in front.

Head rather finely granulose, a line of dusky white pubescence on the inner margin of the eyes, which are large and prominent; rostrum long, cylindrical, nearly straight, rugulose-punctate for two-thirds of its length with the apical third ferruginous, shining, and almost impunctate. Antennæ black, with the base ferruginous; the second joint very short; the third slightly longer than the first. Prothorax distinctly and not very closely granulate; the sides rounded, narrowed, and very slightly constricted in front. Scutellum transverse, clothed with ochraceous pubescence. Elytra distinctly and irregularly granulate, the suture slightly elevated. Underside piceous, clothed with fine slaty gray pubescence; the sterna rather thickly, and the abdominal segments sparingly, covered with ochraceous pubescence. Legs finely pubescent. Length, 9—13 mm.

This species has the form of *Isacantha congesta*, Pasc., except that the prothorax is much less constricted in front; the pubescence is slaty gray above, and the elytra are less strongly granulate than those of the other species.

EMBAPHIODES PYXIDATUS, *Pasc.*

Embaphiodes pyxidatus, Pascoe, Ann. Mag. Nat. Hist., (4) XIII, p. 419, (1874); *loc. cit.* XVI, pl. 1, fig. 6 (1875).

This singular form appears to be very rare. I have only seen a single specimen.

IMALITHUS, sp.?

An old and discoloured specimen of a species evidently belonging to this genus, and apparently distinct from *I. patella*, Pasc., is in the collection of the Australian Museum.

*EUTHYRRHINUS MEDITABUNDUS, *Fabr.*

Euthyrrhinus meditabundus, Fabricius, Syst. Ent., p. 139.

Widely distributed and variable; occurs in Norfolk Island.

AETHREUS CICATRICOSUS, *Pasc.*

Aethreus cicatricosus, Pascoe, Ann. Mag. Nat. Hist., (4) XVI, p. 65, pl. 1, fig. 8 (1875).

I have seen a single specimen agreeing in every respect with the description of this species.

HYBOMORPHUS MELANOSOMUS, *Saund. & Jek.*

Hybomorphus melanosomus, Saunders & Jekel, Ann. Soc. Ent. France, (3) III, p. 304, pl. 15, fig. 8 (1855).

A remarkable endemic form. A large number of fragments and dead remains of this species were found by Mr. Masters under logs and in rotten wood during his visit to the island in June, 1869. As far as I am aware, this is the last occasion on which the insect has been found, none of the collectors who have recently visited the island having obtained it.

IDOTASIA MONTIVAGA, sp. nov.

Elliptic, rather elongate, black, shining; prothorax greatly narrowed in front, strongly punctured at the sides; elytra striate-punctate at the sides.

Head finely and rather closely punctured; rostrum slightly arcuate. Eyes not very prominent, finely granulated. Antennæ piceous. Prothorax in front moderately strongly and closely punctured on the disc, the punctures effaced posteriorly, the sides strongly and sparingly punctured; all the punctures are elongate, those on the disc being aciculate. Elytra at the base rather broader than the prothorax, greatly narrowed posteriorly, strongly striate-punctate at the sides, very obscurely striate-punctate, the interstices rather broad, smooth, and impunctate. Legs moderately long, piceous; femora thickened. Length 3—4 mm.

Summit of Mount Ledgbird (2,500 feet).

Allied to *Idotasia evanida*, Pasc.

IDOTASIA SQUAMIGERA, sp. nov.

Elliptic, rather short, narrow, black, somewhat shining, closely covered with rather large opaque black scales; prothorax with a longitudinal line of yellowish-gray scales in the middle, and a spot of similar scales on each side; elytra with a large spot of yellowish-gray scales in the middle on each side.

Rostrum slightly arcuate. Eyes not prominent, finely granulated. Antennæ piceous. Prothorax greatly narrowed in front, rather strongly punctured. Elytra at the base rather broader than the prothorax, elongate-ovate, somewhat narrowed behind, obscurely striate on the disc, more strongly striate at the sides, where the punctures are visible through the scales, the interstices moderately broad. Legs moderately long; femora strongly thickened, sparingly scaled. Length 2½ mm.

A very distinct species, unlike anything known to me.

CALANDRA GRANARIA, *Linn.*

Calandra granaria, Linnæus, Syst. Nat., Ed. X, p. 378; Jacq. Duval, Gen. Col., pl. 29, fig. 140 (1854).

A cosmopolitan species, which has doubtless been introduced.

CALANDRA ORYZÆ, *Linn.*

Calandra oryzæ, Linnæus, Amoen. Ac., VI, p. 395 (1765); Olivier, Ent., V, p. 97, pl. 7, fig. 81.

Summit of Mount Ledgbird (2,500 feet).

A species of world-wide distribution. Probably introduced in rice or other grain.

APHANOCORYNES PROCERUS, sp. nov.

Elongate, somewhat flattened above, black, shining; rostrum rather long, slightly constricted at the base; prothorax very long, strongly constricted in front; elytra strongly punctate-striate, interstices rather narrow, extremely finely punctured.

Head rather strongly and not very closely punctured; rostrum moderately strongly punctured near the base, finely and densely punctured in front. Antennæ pitchy red, the first joint of the funiculus longer than the succeeding ones, which are of nearly equal lengths. Prothorax more than one and a half times as long as broad, considerably narrowed and strongly constricted in front, rather strongly and not very closely punctured on the disc, less strongly punctured at the sides, with a deeply-impressed line near the anterior margin, which is straight and impunctate; sides feebly rounded. Elytra a little more than one and a half times as long as the prothorax, slightly narrowed behind, strongly punctate-striate, the striæ less impressed near the sides. Legs piceous; tarsi pitchy. Length 4½—5½ mm.

This species appears to approach *Aphanocorynes depressus*, Woll., but the the head and prothorax are much more strongly punctured, and the elytra more deeply striate; the prothorax is also longer, more convex, and decidedly more constricted in front.

COSSONUS LETHARGICUS, sp. nov.

Elongate, parallel-sided, much depressed, black, shining; prothorax strongly and sparingly punctured throughout; the elytra strongly punctate-striate.

Head finely punctured, with a tolerably strong impression in the middle between the eyes; rostrum rather short, dilated in front, finely and evenly punctured. Eyes moderately prominent, finely granulated. Antennæ pitchy, the club covered with fine gray pubescence. Prothorax rather longer than broad, narrowed and somewhat constricted in front, strongly and sparingly punctured, a median impunctate space; the sides rather strongly rounded; posterior margin straight, slightly impressed on each side of the middle. Scutellum small, impunctate. Elytra rather less than twice as long as the head and prothorax together, at the base rather broader than the latter, strongly punctate-striate, the interstices moderately broad and extremely finely punctured; shoulders not very prominent; sides nearly parallel, rounded behind. Legs moderately robust, reddish testaceous. Length 5½—6 mm.

This species is very distinct from any of the Cossonideous beetles contained in the Sydney collections, but as the group is one which has received but little attention from Australian entomologists, I cannot speak with any degree of certainty as to its allies. In *facies* it is not unlike *Cossonus basalis*, Pasc., described from New Guinea, except that is rather more convex, but its sculpture is very different.

ANTHRIBIDÆ.

LITOCERUS BALLI, sp. nov.

Elongate, moderately convex, dull ferruginous, densely clothed with fine ashy gray pubescence; prothorax with two longitudinal piceous bands, one on each side, the basal carina strongly raised and sinuous near the margins; elytra finely punctate-striate, with a slightly raised fuscous spot on each side near the base, and a series of irregular fuscous streaks behind the middle, the apex inclining to brownish yellow.

Head inclining to fuscous between the eyes; rostrum moderately robust, narrowed anteriorly, with a distinct median line; eyes large and prominent, regularly oval, and approximating in front. Antennæ moderately long, slender, furruginous; the last three joints slightly thickened, the middle or penultimate one being somewhat shorter than the others. Prothorax in front a little wider than the head, widening for rather more than two-thirds of its length, then narrowed to the base; the anterior margin straight, slightly thickened; the transverse carina well separated from the base, straight in the middle, sinuate on either side. Scutellum extremely small, finely pubescent. Elytra about three times as long as the prothorax, nearly parallel-sided, rather finely punctate striate, a short stria at the base, next the suture, which is abbreviated long before the middle, the interstices rather broad. Underside and legs closely covered with ashy gray pubescence. Length 12½ mm.; greatest width 5 mm.

A distinct species, unlike anything known to me. It is dedicated to Lieut. H. L. Ball, the discoverer of Lord Howe Island.

CERAMBYCIDÆ.

*CNEMOPLITES HOWEI, *Thom.*

Arimaspes Howei, Thomson, Syst. Ceramb., p. 203 (1864); Lacordaire, Gen. Col., VIII, p. 114 (1869).

A large Macrotomid which I have seen in several collections is probably identical with this species, which was originally described from Lord Howe Island, but as I have not been able to refer to M. Thomson's description I cannot speak with certainty. In colour and *facies* the island specimens agree with *Agrianome gemella*, Pasc., but the prothorax is more closely punctured, especially in front, and the median line is more pronounced. The tibiæ are smooth externally, with no trace of spines.

HOWEA, gen. nov.

Labial palpi with the apical joint slightly elongate, somewhat narrowed posteriorly, the apex truncate. Mandibles short, robust. Head broadly transverse, hollowed out in front between the antennæ. Eyes large, prominent, approximating above, strongly emarginate anteriorly. Antennæ rather longer than the body, somewhat slender, filiform, the basal joint short and thickened, the second very short, the third very long, the fourth to eleventh of nearly equal lengths. Prothorax transverse; the anterior margin raised, sloping towards the sides; the anterior angles produced into long outstanding spines. Scutellum conspicuous, narrowed and rounded posteriorly. Elytra ample, elongate, parallel-sided, rounded behind, not spined at the sutural angle. Prosternal process raised, rounded behind. Legs moderately long, compressed, the femora slightly thickened; tarsi with the first joint decidedly longer than the others; claws slightly thickened at the base.

This genus appears to belong to the division of the Prionidæ known as the Trogosominæ, and to be allied to *Trogosoma* and *Acideres*. Its simple antennæ, feebly-separated eyes, and the form of its prothorax, distinguish it from these and the allied genera which are known to me.

HOWEA ANGULATA, sp. nov.

Plate VI, f. 8.

Elongate, parallel-sided, dark ferruginous, somewhat shining, finely and sparingly pubescent; head and prothorax densely rugose-punctate; elytra strongly punctured, each with three obscure costiform elevations.

Head rather strongly rugose-punctate. Antennæ ferruginous, the basal joint rather darker, strongly punctured, the apical joint slightly narrowed at the extremity. Prothorax broadly transverse, slightly narrowed behind, strongly and densely rugose-punctate, with an indistinct oblique impression on each side at the base; anterior margin thickened and reflexed, somewhat sloping on each side, the angles produced into conspicuous, slightly recurved, blunt spines; posterior margin impressed. Scutellum obscurely rugose-punctate. Elytra at the base considerably broader than the prothorax, nearly parallel-sided, strongly and rather closely punctured on the basal half, less strongly and more closely punctured posteriorly; the sides finely margined, obtusely rounded at the apex. Underside ferruginous; the sterna sparingly clothed with long pubescenee; the prosternum rugose-punctate; abdominal segments finely punctured, sparingly covered with very fine short pubescence. Legs ferruginous. Length 18—20 mm.

Two specimens, one of which is probably the female, as it is of larger size, and has the head slightly hollowed out behind the eyes.

PHACODES OBSCURUS, *Fabr.*

Phacodes obscurus, Fabricius, Mant. Ins., I, p. 151; Blanchard, Voy. Pole Sud., IV, p. 271, pl. 17, fig. 13.

A single example of this widely-distributed Australian species.

*CERESIUM SIMPLEX, *Gyll.*

Stenochorus simplex, Gyllenhal, Schön. Syst. Ins., App. I, p. 178.

A widely-distributed and variable species, which ranges from the Philippines to New Zealand.

CERESIUM, sp.

A species allied to *C. pachymerum*, Pasc., but with the prothorax broader and the legs darker in colour.

HEMESTHOCERA FLAVILINEA, *Newm.*

Hemesthocera flavilinea, Newman, Zool., 1850, p. 111; White, Cat. Long. Brit. Mus., VIII, pl. 6, fig. 2.

This somewhat local Australian species appears to be common in the island.

CLYTUS AUSTRALIS, *Lap. & Gory.*

Clytus australis, Laporte & Gory, Mon., p. 99, pl. 19, fig. 118.

Widely distributed, ranging from Australia and New Guinea to the Philippine Islands.

*BLAX WOLLASTONI, *White.*

Deucalion Wollastoni, White, Proc. Zool. Soc. Lond., XXIV, p. 406, pl. 40, fig. 6 (1856)—*Blax Wollastoni*, Thomson, Class. Long., p. 23 (1860).

This species appears to be tolerably common.†

XYLOTELES SEGREX, sp. nov.

Elongate, sub-cylindrical, somewhat narrowed both in front and behind, piceous, tinged with bronze-green, rather thickly clothed with gray pubescence; elytra striate, rather strongly punctured at the base, each with a patch of dusky white pubescence near the apex.

Head transverse, finely pubescent, with a distinct median line. Antennæ pitchy, finely pubescent, the bases of joints 3—11 inclining to reddish testaceous. Prothorax about as broad as long, very finely and not very closely punctured, with two moderately-impressed transverse lines, one near the anterior margin, the other near the base. Scutellum closely covered with fine yellowish-white pubescence. Elytra somewhat narrowed behind, moderately distinctly striate, with longitudinal series of punctures near the base, which are effaced posteriorly, closely covered with fine gray pubescence; the sides sub-parallel, gradually rounded to the apex, which is not produced. Legs finely pubescent; the tibiæ and tarsi inclining to reddish testaceous. Length 6—9 mm.

Allied to *Xyloteles griseus*, Fabr., and *X. Pattesoni*, Oll.; compared with the latter it is decidedly more pubescent, and has the elytra less narrowed posteriorly.

SOMATIDIA PULCHELLA, sp. nov.

Plate VI, f. 4.

Elongate, very convex, narrowed both in front and behind, bronze green, shining, tinged with purple, very sparingly clothed with erect testaceous setæ; elytra strongly punctured near the base; antennæ, tibiæ, and tarsi pale reddish testaceous; femora fuscous.

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† I take it that *Blapsilon irroratum*, a New Caledonian form, is erroneously recorded from Lord Howe Island in the explanation of Plate V, in the Journal of Entomology (vol. i, p. 132), as no reference is made to the locality in Mr. Pascoe's text.

Head transverse, finely and sparingly pubescent, with a few punctures on the disc; the median line distinct. Antennæ with the third joint rather longer than the first, the succeeding joints slightly decreasing in length. Prothorax longer than broad, less narrowed in front than behind, subcylindrical, rather strongly and closely punctured, the punctures less strong anteriorly, clothed with very fine pubescence and scattered setæ. Scutellum triangular, very small. Elytra elongate-ovate, the punctuation strong and moderately dense near the base, gradually effaced posteriorly, clothed with very fine gray pubescence near the suture and at the sides, with four rows of long erect setæ which emanate from punctures, and are separated by considerable intervals; each elytron with three longitudinal elevations on the basal half, of which the first only is conspicuous. Legs moderately long, finely pubescent; the femora thickened. Length 10 mm.

Summit of Mount Ledgbird (2,500 feet).

This is a very pretty and distinct species; its habit is particularly striking from the fact that the pale-coloured setæ are shown up with unusual clearness against the dark pigment of the elytra.

SOMATIDIA CAPILLOSA, sp. nov.

Elongate, moderately convex, narrowed both in front and behind, fuscous, strongly setose; elytra strongly punctured near the base, obscurely punctured posteriorly; antennæ fuscous, the basal, and two-thirds of joints 2—11, reddish testaceous.

Head transverse, finely and obscurely punctured, clothed with fine gray pubescence and scattered setæ. Antennæ moderately long, the third joint about as long as the first, the fourth, a little longer than the third, the succeeding joints slightly decreasing in length. Prothorax rather broader than long, less narrowed in front than behind, rather finely and closely punctured, the punctures rather closer at the sides than on the disc, clothed with fine gray pubescence and scattered setæ. Scutellum very small, triangular. Elytra elongate-ovate, the punctuation rather strong and moderately close near the base, less close and somewhat obscured posteriorly, thickly clothed with fine gray pubescence, and rather closely covered with rows of long testaceous setæ, which emanate from punctures. Legs moderately long, finely pubescent; the femora thickened; the bases of the tibiæ and the tarsi inclining to reddish testaceous. Length 5½—6½ mm.

SOMATIDIA ARANEA, sp. nov.

Elongate, convex, narrowed both in front and behind; head and prothorax ferruginous, the latter densely and strongly punctured; elytra piceous, tinged with bronze-green, strongly and densely punctured; antennæ and legs pale testaceous.

Head very finely pubescent, with a few scattered punctures. Antennæ with the tips of joints 4—10 fuscous. Prothorax a little broader than long, rather more narrowed behind than in front, densely punctured. Elytra ovate, rather short, the punctuation strong and dense on the basal two thirds, inclined to rugosity, less dense posteriorly, where they tend to range themselves in rows; the apex smooth. Legs moderately long; the femora thickened. Length 4 mm.

A single specimen. In habit this species approaches the New Zealand *Somatidia ptinoides*, Bates.

*MONOHAMMUS FISTULATOR, *Germ.*

Monohammus fistulator, Germ., Ins. Spec. Nov., 1824, p. 478.

Widely distributed in the Eastern Archipelago, ranging from Java to Australia.

MONOHAMMUS FASCIATUS, *Montr.*

Monohammus fasciatus, Montrouzier, Ann. Soc. Agr. Lyon, VII, p. 63 (1855).

A widely-distributed species.

ZYGOCERA BIFASCIATA, *Pasc.*

Zygocera bifasciata, Pascoe, Trans. Ent. Soc. Lond., (2) V, p. 32 (1859).

A single example, which differs from the ordinary *Z. bifasciata* in wanting the elytral fasciæ. In all other points it entirely agrees with that Australian form, and I am, therefore, inclined to regard it as a variety which probably is not geographical, but merely individual.

SYBRA, sp.

A single specimen.

CHRYSOMELIDÆ.

CHÆTOCNEMA, sp.

Many discoloured specimens.

COCCINELLA TRANSVERSALIS, *Fabr.*

Coccinella transversalis, Fabricius, Spec. Ins., I, p. 97 (1781).

A very widely-distributed species.

The other orders of insects have not received much attention from the various collectors who have visited the island, but a considerable number of Lepidoptera and Hymenoptera have been obtained from time to time. The latter, unfortunately, cannot be determined in the present unsatisfactory condition of our local collections of the order; but the occurrence of *Diamma bicolor*, Westw., and *Thynnus Leachiellus*, Westw., are facts of some interest and importance.

The butterflies are represented by the following species:—*Danais plexippus*, Linn., *D. petilia*, Stoll., *Pyrameis cardui*, Linn. (var. *Kershawi*, McCoy), *Junonia vellida*, Fabr., *Hypolimnas bolina*, Linn., *Charaxes sempronius*, Fabr., *Lycaena boetica*, Linn., *Terias smilax*, Don., *Papilio erectheus*, Don., and *P. Macleayanus*, Leach. Of these it will be observed that the species are either of wide distribution or identical with common Australian forms. Two species of Sphingidæ, a number of obscure Noctuidæ, and other Heterocera are contained in the collection of the Australian Museum; of these the only recognisable species are *Protoparce convolvuli*, Linn. (var. *distans*, Btl.), *Dasypodia cymatodes*, Gu., *Achaea melicerte*, Dr., *Nyctemera amica*, Wh., and *Asopia farinalis*, Linn. The *Dasypodia* was found in immense numbers by Mr. Etheridge and his party in small caves on the sea-shore.

The Orthoptera are represented by species of *Blatta*, *Gryllotalpa*, and *Phaneroptera*, as well as by the huge wingless phasmid *Eurycantha australis*, Montr. This curious creature is generally known among the islanders as the "tree-lobster," and it appears to be very abundant, almost every collection from the island being found to contain specimens in all stages of growth, a fact which would seem to indicate that they are not restricted in their appearance to any particular season of the year. The gigantic water-scorpion, *Belostoma indicum*, St. F. & Serv., recently found by Mr. Langley, and a few small Nabiidæ complete the list of insects known to me.

A. SIDNEY OLLIFF.

No. 5.

THE PHYSICAL AND GEOLOGICAL STRUCTURE OF LORD HOWE ISLAND.

BY

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PHYSICAL AND GEOLOGICAL STRUCTURE OF LORD HOWE ISLAND.

I.—Physical Structure.

THE geographical position of Lord Howe Island has been already described, and it has been shown that under this name are included a number of outlying rocks. Chief amongst these are the Admiralty Islets to the north; Mutton Bird Island to the east; Rabbit or Goat Island, within the Lagoon, on the west; and the solitary pinnacle, Ball's Pyramid, away to the south-east.

The outline of Lord Howe Island itself is roughly crescentic, or, as very appropriately termed by Mr. H. T. Wilkinson, J.P., "boomerang-shaped."* The length, as the crow flies, is six or seven miles, or, taking into consideration the inequalities of the surface, probably nearly double that distance. The average width is one mile, but at the southern end of the island it is considerably more. The island has been estimated, by Mr. Charles Moore,† to contain 3,220 acres, 2,000 of which would be capable of cultivation. Personally I do not think that much more than a third of this amount will ever be fit for the agriculturist, and then only under certain conditions.

On approaching from seaward its bold, and in many places, rugged outline becomes apparent; whilst the close and intricate growth of the vegetation on the hill slopes obscures its really heavily timbered condition.

Lord Howe Island is practically formed of three high volcanic ridges, the most striking physical features of which, says ‡ Mr. H. T. Wilkinson, "are the mountains known as Mount Gower and Mount Ledgbird. The former rises in cliffs from the sea to an altitude of 2,840 feet and the latter to a height of 2,504 feet, together forming the southern and south-eastern portion of the island and presenting a coast-line of rugged cliffs inaccessible from the sea." The most northerly of these masses forms the northern extremity of the island, and is known as the North Ridge; the central mass forms Mount Lookout; and the southern, and by far the largest is composed of the two large hills before mentioned, with a few subsidiary eminences, such as the North Hummock and Intermediate Hill. These form the back-bone, as it were, of this most interesting spec of oceanic land, aptly termed the "Madeira of the Pacific," § and are visible at sea for a distance of at least fifty miles. The intermediate depressions are formed of low undulating rises; and the shore frontages, when not precipitous, are flat and usually open, but sometimes like the low rises densely wooded. Nearly two-thirds of the west coast, or the concave side of the boomerang, to follow out Mr. Wilkinson's simile, is protected by a fringing coral-reef, extending from Phillip Point on the north, to the foot of Mount Ledgbird on the south.

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* Report on the Geology of the Island, *Lord Howe Island. Report on Present State,* &c., p. 4.

† Hill's *Lord Howe Island, Loc. cit.*, p. 17.

‡ *Op. cit.*, p. 4.

§ The Island of Lord Howe. "The Madeira of the Pacific." By "Linnæus" (12 mo. Sydney, 1882).

The North Ridge is broken up into a series of semi-detached peaks, presenting a bold face to seaward, rising from soundings of ten and eleven fathoms in precipitous vertical cliffs, of from 600 to 700 feet, without the intervention of any beach. The north-east end of this ridge terminates in the North Peak, or "Pools-Lookout," a well rounded hill of 714 feet. Following the cliffs along to the westward, over successive minor rises, a peculiar semi-isolated hill is approached, standing in majestic solitude, and known as Mount Eliza. It has all the appearance of a conical hill cut vertically in half, concave or hollowed out towards the sea, and presenting to the eye, as viewed from a distance, a curved crescentic outline. It has been exceptionally well described by "Linnæus," who says, "resembling a divided cone with a peaked top." This rugged promontory terminates to the north-west in a bold craggy headland, running north and south, the northern extremity being known as Phillip Bluff, and the southern, Phillip Point. Under the precipitous cliffs of this end of the island, soundings are obtained varying from seven to fifteen fathoms, but there are no gulches or gullies running up from the sea-level. The only indentation is near Phillip Bluff, where a short but deep water-way runs in under Mount Eliza. Along the face between the two points mentioned above, one or two sea-washed caves exist, but no opportunity of exploring these was afforded to our party. Two spurs tending in a southerly direction, are given off from the North Ridge. The boldest and most precipitous is an off-shoot of the North Peak, and overlooks Ned's Beach Bay on the east coast. From the smaller isolated peaks of this spur, one of the most beautiful views on the island is visible. Looking south the entire length is laid out before the eyes of the observer, across the tops of Mount Lookout and Intermediate Hill, or on the other hand, over the Lagoon, along the nearly vertical sides of Mounts Ledgbird and Gower. An excellent photograph, taken from a water-colour drawing, has been published by the Government Printer of this view, and is the best general panoramic view of Lord Howe Island.

The second spur proceeds from near the centre of the North Ridge, and projects as a well rounded sloping promontory into the Lagoon. Between its western side and Phillip Point is enclosed the North Bay, forming the most northerly arm of the Lagoon, and well protected from the heavy south-west seas which at times break upon this part of the island, by one shore end of the coral-reef. On the eastern side of this promontory is a sub-marine depression in the Lagoon, known as the Boat Pool.

Between the North Ridge and the main mass of the island is a narrow connecting neck of land, principally formed of the second volcanic mass, known as Mount Lookout, surrounded by at least two-thirds of the only undulating and flat ground on Lord Howe. Mount Lookout is a conspicuous and rather conical hill on the east coast, overlooking the northern end of Blenkinthorpe Bay, 414 feet high, and commanding an uninterrupted view to the sea horizon in nearly every direction, the only exception being to the north and south. Slightly separated from Mount Lookout is a more or less flat table-land extending diagonally across the island at its south-west extremity, forming a low point, overlooking as near as possible the centre of the Lagoon. Two prominent headlands are thrown out from Mount Lookout; that to the north-east is called by the inhabitants Clear Place Point, but on the Admiralty chart is marked Observatory Spot. The coast-line between this point and the southern off-shoot, which forms the northern termination of Blenkinthorpe Beach, is formed by high steep slopes and overhanging cliffs, but not to the same extent as those of the North Ridge. Clear Place Point is one of the few, if not the only spot, from whence a complete view, looking north-west and south-east, can be obtained of the Admiralty Islets, and Ball's Pyramid, about eighteen miles away in the ocean, at one and the same time.

Between the elevated ground of Mount Lookout, and the North Ridge, the surface is either flat, or rises in undulating heights, densely wooded. The highest point is a more or less flat-topped hill overlooking the south side of Ned's Beach Bay, and by rough barometrical measurement is 200 feet above sea-level. This hill, which I have called Wilkinson's Promontory, is of the greatest importance from a geological point of view, as being the highest point to which the Coral-sand rock, to be afterwards described, has been traced. The intervening flat ground extends along the shore of the Lagoon, forming to the south of Mount Lookout, Moseley's Flat; and to the north, the flats fringing and running between the hills previously mentioned. The most important are those at the Old Settlement under the North Peak, and that extending from the landing place near Thompson's Point across the island to Ned's Beach. Ground of this description is either open and grassed, as Moseley's Flat, and the Old Settlement, with patches of low stunted vegetation; or undulating and densely wooded like the slopes of Wilkinson's Promontory and the tract across to Ned's Beach. The vegetation here is extremely dense, comprising some of the finest trees, especially the magnificent Banyan (*Ficus columnaris*, Moore). Speaking generally, many portions of these flats are but a few feet above high-water mark—this is particularly applicable to Moseley's Flat, which is protected at its eastern side by sand hummocks.

From the southern end of Moseley's Flat to Point King, the projecting headland at the final base of Mount Gower, the island is formed by the largest of the three volcanic masses. To all intents and purposes, it forms at least half the superficial area, and is at the same time the most precipitous and grandest half. The ground by degrees rises from Moseley's Flat, sometimes by a gradual ascent, at others by steep and sudden jumps to a height of 2,840 feet, the top of Mount Gower. This portion of Lord Howe consists of four separate hills, grouped two and two. Those at the northern extremity are the least important, North Hummock, and Intermediate Hill, the latter said to be 647 feet. It throws off a spur seawards, forming Mutton Bird Point, attached only by a narrow neck of land, and which after a few years more denudation will become an islet. It is in a direct line with Mutton Bird Island, doubtless separated from the main island at a comparatively recent geological epoch. From this point the coast-line southwards is bold and precipitous in the extreme, and is only known to a few of the more adventurous of the Islanders. The deep valley between Intermediate Hill and the northern extremity of Mount Ledgbird is traversed by the Deep Creek, probably the most important rivulet on Lord Howe. It takes its rise in the various gullies, furrowing the sides of Intermediate Hill, and the saddle formed by a low spur from Mount Ledgbird. After much tortuous winding, and with its banks covered with a dense sub-tropical vegetation, it discharges itself into the southern part of the Lagoon. As the valley is descended it gradually opens out into a well marked alluvial flat, circumscribed by a spur of Intermediate Hill on the north composed of the Coral-sand rock, and the foot of Mount Ledgbird on the south. The edges of this flat, and the course of the creek are noticeable for the number and size of the Pandanus trees distributed along it. The latter marks also the inland track to the southern high grounds, a continuous ascent taking place until the divide at the head of the Deep Creek Valley is reached, the track crossing it at a point called the "Smoking-tree," 430 feet above sea-level. On the further side of this ridge a descent takes place into a subsidiary valley, the track gradually ascending again on to a direct spur of Mount Ledgbird where the crossing place is known as the "Half-way Root," or "Red-clay Saddle," about 550 feet high. Beyond this point the traveller becomes committed to the rugged and almost inaccessible spurs and gullies, with which the eastern flanks of Mount Ledgbird are seamed. The latter are in many places deep, invariably steep, as a rule well watered, and frequently interrupted by steep walls of rock, over which the water-courses must run at certain seasons with great rapidity and force. The sides are strewn with basaltic boulders, varying from a hundredweight to many tons, masses of loose rock and general *débris*, intermingled with fallen timber, and dense and in many places impenetratable foliage. So much have the hill sides become covered with fallen material that rock *in situ* is seldom seen except in the beds of the gullies, or as steep and impassable walls in their courses, or on the spurs between them, and which have to be invariably circumscribed before the travelling line can be regained. To add to the difficulty of locomotion the slopes are in places covered with large expanses of sheath-grass and palm scrub, but the gullies are at times beautifully shaded with large tree-ferns. Such is the general aspect of the eastern slopes of Mount Ledgbird, up to the foot of the immense precipice known as "The Wall," at an elevation of about 1,000 feet—a perpendicular face of basaltic rock, above which the sides of the mount, both here as well as on the west and north, rise in a series of high perpendicular step-like terraces, to a height of 2,504 feet. A little north of the summit of Mount Ledgbird, a line drawn east and west represents the broadest part of the island—about one and a half miles as the crow flies. On the eastern side this line would terminate on the peninsular of East Point, having three well-marked indentations of the coast line. So far as I have been able to ascertain, this is the least known portion of Lord Howe. Even Mount Ledgbird is not as frequently ascended as Mount Gower, and its topography is less known. On its western side, overlooking the Coral Reef, the slope is steeper than on the east, and practically inaccessible, rising in sheer vertical precipices of great height one above the other. The mode of progression along the eastern flanks of Mount Ledgbird is graphically described by Mr. R. D. Fitzgerald, then Deputy Surveyor-General, who accompanied Cloete's expedition to Lord Howe. He says: "The track gets worse and the faces more frequent, with water pouring over them. The ferns grow thicker, and the orchids are in flower, but the path is steeper, and often the roots of the 'forked trees,' that grow down like soldiers' piled muskets, have to be cut through with a tomahawk, being too close for the traveller, though the guides may writhe through them, and Ned stops now and then and declares the 'face' to be impassable, when a descent has to be made with reluctance, for an ascent has to be made to make up for it; and so 'face' after 'face'—which become very frequent towards the end—are passed, and at length 'the saddle,' *par excellence*,* or backbone of the camel between its humps,† is gained, and the day's work is over.'"‡

At its southern end Mount Ledgbird throws off two spurs. That towards the south-east descends to form the connecting saddle with Mount Gower, and must be passed over in following the tract for the ascent of the latter. From this spur a very magnificent view of the south-east side of Mount Gower is obtained, and, on a clear day, Ball's Pyramid, away in the ocean. We were fortunate enough to traverse this part of the island on such, and were well rewarded for our exertions in climbing to this height.

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* The divide between Mounts Ledgbird and Gower.

† Mounts Ledgbird and Gower.

‡ Hill's *Lord Howe Island, loc. cit.*, p. 40.

The second spur stretches to the south-west, and almost overhangs the sea in a series of wall-like terraces. Below the lowest wall is a much shorther, but very dangerous track to Mount Gower, which rises from the beach a little beyond the shore end of the Coral Reef, and, after passing under the spur, skirts the north side of Erskine Valley. This track, called the Lower Road, was partially traversed by Mr. Thorpe and the writer, under the guidance of Mr. W. Nichols, and afforded a good opportunity of examining the horizontal basaltic rocks of which the wall is formed. Here again I cannot do better than quote the description by Mr. Fitzgerald, who explored the whole of this path:—"The summit of the precipice, one of the flanks of Mount Ledgbird, facing the sea . . . . was at length reached . . . . Then began a very rapid descent over loose rocks and crumbling basalt, and the guides spoke of a 'bad bit' . . . . Down and down, till a thousand feet from the ridge was reached; when, on turning a rock, they got the first glimpse of the 'bad bit,' and a '*bad bit*' it was—a track across the face of the precipice . . . The precipice rose on the right hand sheer and naked, perpendicular as a wall for a thousand feet; then a little rubbish, with here and there a stunted plant. Then the track, not more than two feet wide, and then down 500 feet to the palms. . . . What a treasure those little bushes are; but there are places where there are none, where there is nothing to grasp but the roughness of the perpendicular rock; and there are places—'gulches'—where the path itself is gone, and foot holds have been cut with a pick in the rock or gravel. . . . In all that dangerous track the rounding of the angles is the worst, when you cannot see where you are going, and grasp at anything with one hand, reluctant to let go the other, and the other is sidled on *over nothing*. But the last angle is turned, and they stand again upon the talus of the precipice, and it is grand—oh, wonderfully grand to look upon it—1,000 feet of grey perpendicular basalt, the very highest mass of which overhangs the base."*

The apex of Mount Ledgbird is formed by what Mr. E. S. Hill terms, "a dome-like eminence, rising out of, but at no great height from its centre, and having precipices of from 100 to 200 feet sheer down from its base." There are, in fact, three apices to this hill, and according to the published charts the centre is the most elevated.

Mounts Ledgbird and Gower are separated by Erskine Valley, or the "Between Hills," a deep and wide depression, running down to the south-west coast. Its descent is very rapid and steep, with more or less permanent water, the sides of the valley being everywhere covered with boulders and volcanic *débris*, interspersed amongst the densest possible vegetation. The saddle at the head of this declivity, forming the connecting neck between the two hills, is very narrow, probably not more than twenty to thirty yards, covered with large boulders, and supporting a low, stunted vegetation, and much under-growth, bearing testimony in the twisted and gnarled condition of the trees to the heavy squalls and gales which pass across it, and of which we had a vivid personal experience during the night we were camped in this otherwise charming spot. Erskine Valley acts, in fact, as a kind of funnel, and reminded me much of the deep, long gulches with which the Island of St. Helena is cut up. The saddle cannot be far short of 2,000 feet above sea-level.

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* Hill's *Lord Howe Island, loc. cit.*, p. 43.

The further ascent of Mount Gower from this divide is one long, steep, and in places almost vertical climb. The sides of this hill are much less broken up into terraces than is the case with Mount Legdbird, the immediate scarp or wall below the summit being of great height and grandeur. The latter, as compared wirh other portions of its surface, is flat, of about half a square mile in extent. Mr. John Duff remarks that "the top of Mount Gower is probably 150 or 200 acres in extent, chiefly flat, with numerous creeks and ravines across its centre. The soil is composed of sphagnum (moss) and other decayed vegetable substances. All the trees on it are stunted in growth."* Mount Gower rises to a height of 2,840 feet

Taking the coast line of Lord Howe Island generally, it may be said that from Phillip Point on the north-west to Ned's Beach on the north-east; and again from Mutton Bird Point on the east round the south end of the island to Erskine Valley on the south-west, it is more or less inaccessible. The chief breaks in its continuity are the following:—To the north-east of Phillip Bluff a short narrow inlet occurs, almost at the base of Mount Eliza, and known as the "Gulch." A comparatively small depression of the island would cause the waters of the North Bay within the Lagoon to join with those of the open sea through this gut-way. Immediately at the north-east corner of Lord Howe Island is the pleasant Ned's Beach Bay, protected by a long ledge of rocks, in six and seven fathoms of water, and encircling the point of the North Peak, and terminating at the Sugar-loaf, a basaltic mass between the point and the Admiralty Islets. Some distance round the south headland, enclosing the before-mentioned bay, are a series of rocky inlets, terminating to the south in Middle Beach Bay. This headland is a prolongation of the Coral-sand rock plateau previously referred to, and, both from its importance, and lacking a name, I have termed it Wilkinson's Promontory.†

Middle Beach Bay is a snug little harbour, and has the good repute of being the only landing-place which can be depended on in all seasons and weather. A narrow calm channel exists between two sunken rocky reefs, in which the water, from two to nine fathoms, no matter how it may be raging outside and around, is always calm and comparatively still.

From Middle Beach, following the coast-line round Observatory Point and the rocky flanks of Mount Lookout, Blenkinthorpe Bay is approached, terminating to the south-east in Mutton Bird Point. This bay is the most pleasant coast recess on the island, and is the only instance of sand accumulation in any way approaching the dune, or rather hillock formation. Beyond the previously mentioned headland to a point opposite the southern extremity of Mount Ledgbird, the shore is much broken up into cliff-girt harbours, only one of which, Boat Haven, appears to have received a name. From the point just indicated the coast follows an unbroken line to King Point, the southern extremity of Lord Howe.

On the west coast the great feature is the Lagoon, about three and a quarter nautical miles in length, with an average breadth of half to three-quarters of a mile, but narrowing very much towards its southern end. The shore line south of Thompson's Point is generally uniform, the only projecting point being opposite the south-west roadstead entrance. The head or deepest portion of the bay washes the shore of Mosley's Flat. A further description of the Lagoon and its enclosing reef will be found in the previous Zoological Report.

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* Report on the Vegetation of the Island.—*Lord Howe Island, Report on Present State, &c.*, p. 10.

† After the late Mr. H. T. Wilkinson, J.P., of the Department of Mines, Visiting Magistrate at Lord Howe.

Ned's, Middle, and Blenkinthorpe Bays each have fine expanses of sandy beach, backed at the first by low sand hummocks, and at the last by incipient dunes; but neither of these is to be compared to the fine stretch of sand extending for one and a quarter miles along the Lagoon, from Thompson's Point to the southern boundary of Mosley's Flat.

The creeks on Lord Howe Island are, strictly speaking, unimportant, and such one would anticipate from the small area of the island, A short water-course exists at the Old Settlement and receives the drainage of the gullies traversing the amphitheatre of the east end of the North Ridge. No other creek is met with until the flat ground between Intermediate Hill and Mount Ledgbird is reached. Here occur the Deep Creek and its branch, the Soldier's Creek, which drain the extensive area formed by the flanks of Intermediate Hill, the connecting ridge as high as the Smoking Tree, and thence round the precipitous north-west side of Mount Ledgbird. A short distance further south is the Fresh-water Pool, a rocky gorge cutting through the western terraces of that remarkable hill. The two former creeks have small sand bars at their mouths, and communicate with the Lagoon only during freshets or at high tides. In each case, after leaving the higher ground, their water-courses meander through small alluvial flats, formed by the detrital matter brought down by them. Along the edges of the flat at the Soldier's Creek, and up the course of the Deep Creek are to be found many fine examples of the Pandanus (*Pandanus Forsteri*, Moore). The gullies in which these creeks terminate are invariably steep, assuming in many cases, especially in the southern part of the island, the aspect of miniature mountain torrents. In all probability the deepest gully is Erskine Valley, although some of those on the north-east flanks of Mount Ledgbird are not by any means to be thought lightly of. On the other hand, one of the most beautiful and impressive ravines is the Valley of the Shadow of Death, already referred to in the Zoological Report, running up from Middle Beach, past the Observatory Point, and draining the plateau of Mount Lookout. Doubtless during long continued rain many fine leaps of water are to be observed on Mounts Ledgbird and Gower. In H. F. White's map is shown a swamp in a portion of what is now known as Mosely's flat, but this did not come under our notice.

The vegetation of Lord Howe is, next to its general outline, its grandest feature. "It is," says Linnæus, "peculiarly beautiful and striking, and to treat it in any exhaustive way, would require a special artist devoted to it."* On approaching from seaward, especially on the western side, its heavily clothed state is not in the least apparent, the view showing "how deceptive the appearance of foliage may be where there are no great irregularities in the growth of the trees, for when looked down upon, though of considerable size, from the evenness of the general surface they look dwarfed and stunted, which is the case in looking at them from the sea also."† To this is due the apparent rounding and non-precipitous outline of many of the eminences of the island, even including some portions of the rugged southern hills. The botany has to a great extent been already described by Mr. Charles Moore,‡ and Mr. Duff.* The salient points brought forward by Mr. Moore clearly prove the Lord Howe flora to incline far more towards that of New Zealand and Norfolk Island than to that of New South Wales. This has a great bearing on the geological facts shortly to be communicated on. Those typical Australian families, the Leguminosæ and Myrtaceæ are barely represented, whilst the Proteaceæ are said to be wholly wanting. "The typical plants of the island are four palms," says "Linnæus," by whom the best popular account has been written, "a ficus with the habit of the Indian banyan, and several large foliaged plants of great beauty. The timber-trees are numerous, and these yield wood of great excellence for building and cabinet work. But perhaps the most noticeable feature of the vegetation of Lord Howe is the number of varieties of climbing, twining, and creeping plants, some of which are exceedingly striking."†

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* "Linnæus," *loc. cit.*, p. 24.
† Hill's *Lord Howe Island*, p. 41.
‡ *Ibid*, p. 17.

The flora of Lord Howe Island being of very great interest, I make no apology for extracting the following information from Mr. Moore's interesting account, and that of "Linnæus." The Orchidaceæ are sparingly represented by *Dendrobium*, and *Sarchochilus* growing on trees, but Mr. Moore is mistaken in limiting these to those growing on the hill sides. They certainly frequent the low ground timber almost as plentifully. There are four palms, and their distribution has already to some extent been referred to (p. 5). The "Thatch Palm" (*Kentia Forsteriana*), and the "Curly Palm" (*K. Belmoreana*) occupy the lower zone, ranging up to 1,000 feet, when their place is taken by the "Umbrella Palm" (*K. Canterburiana*), which covers only a limited belt, according to Mr. Moore, but "Linnœus" states that it can be traced to the top of the highest mountain, which is, of course, Mount Gower.‡ The fourth variety is *Kentia Moorei*, the "Mountain Palm," and is only found at elevations exceeding 2,000 feet. It is a dwarf form and of very graceful outline.

The trunks of the "Thatch Palm" are used as the main timbers for building purposes, and when split form battens, whilst the fronds are utilized for thatching purposes, hence the name. The "Curly Palm" is less robust than the preceding, and has erect pinnæ, producing a striking contrast to those of the former, which are pendulous.

Equally striking in appearance are the *Pandani* or "Screw Pines," of which Mr. Moore believes there are two species. The "Tent Tree" (*Pandanus Forsterii*, Moore) grows both on the flat ground and on the hill-sides to an elevation of 2,000 feet; but, so far as my own observation went, only where the soil is of a volcanic nature.

As previously stated, the tree of the island is the Banyan. "It marks distinctly an inner zone of vegetation, being protected on every side by belts of trees of various descriptions. It possesses, to an extraordinary degree, the branching characteristics of the famous "Banyan" of India (*Ficus indica*). From its high wide-spreading branches adventitious roots are produced, which descend to the ground, then rapidly enlarge, and become in the course of time huge stems, drawing nourishment from the earth, for the support and increase of the parent branch, which, as it extends, produces similar root stems; the tree by this means covering a very large space of ground.§ . . . This interesting tree appears to be new and confined to the island, its column-like stems suggesting the specific name, *columnaris*, proposed to be given to it. In character it is allied to *Ficus microphylla* of this Colony; but the smaller size of the fruit and foliage, and its numerous root-stems, at once distinguish it from that species."[*]

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* Report on the Vegetation of the Island, *Lord Howe Island, Report on Present State, &c.*, *loc. cit.*, pp. 8–11.

† "Linnæus," *loc. cit.*, p. 21.

‡ *Ibid*, p. 22.

§ Some of these trees cover at least half an acre of ground.

One of the most conspicuous trees is the *Hemicyclia australasica*, Mueller, to which attention is at once attracted by its red-coloured plum-like fruit. The trees of most frequent occurrence are *Hibiscus Patersoni*, the "Juniper," *Myoporum acuminatum*, Br., and a tree supposed to be the "Manchineel" mentioned by Ball—*Ochrosia elliptica*. They occur always near the coast, and form the outer or protecting belt of trees. Epacridacious plants are represented by the large *Dracophyllum Fitzgeraldii*, found in Erskine Valley. It reaches as much as forty feet high, with a trunk at least two feet in diameter. It is allied to indigenous species of New Zealand and New Caledonia. There is a Mistletoe-like parasite *Viscum opuntioides*, Forster, but is restricted, Mr. Moore says, to *Hemicyclia* and *Elæodendron*, and kills the timber upon which it grows. It is also found in Norfolk Island. A cane-like climbing plant, *Flagellaria*, completely uniting surrounding trees; and the "Tulip Tree," *Fugosia Pattersonii*. We had very unpleasant experience of a most offensive plant, which appears to be generally distributed over Lord Howe, called the "Stink Plant," *Coprosoma putida*, Moore and Mueller, emitting a smell from its bruised leaves or branches not easily forgotten, and described by Mr. Moore as "perfectly abominable." It reminded us more than anything of the odour from an ancient cesspool. Lieutenant Ball speaks of the Mangrove, but Mr. Moore says that *Ægiceras fragrans* was observed only at the mouth of a small creek from Mount Gower. We did not see it.

Many very beautiful ferns were observed; but I regret to say that the tree-ferns are not found in the profusion they appear to have once existed, except in the more inaccessible parts of the island. Mr. Moore mentions two new arborescent species of *Alsophila*, and *A. excelsa*, Br., with *Trichomanes meifolium*.

At the top of Mount Gower occur another fine species of *Trichomanes*, *Lomaria capensis*, and *Hymenophyllum tunbridgense*, where they grow in great profusion.

The general set of the currents is from the north and north-east, but the local currents around the island appear to be very variable. The most important one is that running through the Sugar-loaf Passage, between the main island and the Admiralty Islets. The larger number appear to be one knot currents.

The tide rises and falls about six feet. There are two good anchorages, one on each side of the island. That on the east lies off Ned's Beach in 16–18 fathoms, and is known as the North-east Roadstead. The second is called the South-west Roadstead, and is situated outside the main middle entrance to the Lagoon, in 15–18 fathoms; and there is a temporary anchorage outside the north end of the reef. A well-defined 20 fathom line exists on the east, and supposing an elevation of this amount to take place, it would be the means of adding to the superficial area of Lord Howe in that direction, and northerly and southerly, land many times its present size.

The prevailing winds in summer are from the south-east, and during winter from the south-west, the latter at times blowing with great violence, accompanied by severe rain squalls. According to Mr. E. S. Hill, "cyclones from the N.N.W. occasionally devastate a confined area of from 40 to 50 yards wide," but these are not of frequent occurrence. The steep gullies

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[†] Moore, in Hill's *Lord Howe Island*, *loc. cit.*, p. 21.

between the various hills afford excellent gathering places, whence heavy gusts sweep down on the surrounding sea, especially the Lagoon, in the form of miniature whirlwinds, taking up the water in masses of spray. These "wollies," as they are termed by the inhabitants, resemble the heavy winds which traverse the deep ravines and valleys of St. Helena, and are so dangerous to passing shipping. The approach of these gusts when passing over the more level portions of the island can always be detected by the loud rushing noise which heralds it.

The heaviest rain is from the south-east; but true periodical rains are said not to occur. Showers, however, are abundant throughout the year.

The temperature during summer is fairly warm; we were told that it was sometimes as much as 80°, but the winter is tolerably genial. On the whole, it may be described as more equable than that of the general sea border of New South Wales.

The Admiralty Islets are eight in number, six in the main cluster, and two more or less detached representing North Island, some little distance removed from the former. The central and largest is nearly half-a-mile long, exceedingly steep, and, like Lord Howe, precipitous on its eastern side. It is probably about 300 feet high. An elevation of ten fathoms would place these islets in communication with the main island.

Mutton Bird Island is a rather quadrangular, rocky, and inaccessible islet, seven miles east of Blenkinthorpe Beach, 265 feet high, and with a central dome-like eminence. It lies within the 20-fathom line. Both it and the Admiralty Islets can only be approached in the finest and most settled weather, a landing at any other time being quite impossible.

Close to, but separated from King Point, the southern extremity of Lord Howe, is a small circular islet, known as Gower Island, with deep water immediately outside it.

The only other islet contiguous to Lord Howe is Goat or Rabbit Island, within the Lagoon, an oblong piece of land 114 feet in height. Its outer or western end gives attachment to a portion of the fringing reef.

By far the greatest interest, however, centres itself in the isolated and mysterious Ball's Pyramid, situated some eighteen miles to the south-south-east of Lord Howe. In outline it is described as pyramidal,* rising, without a break, 1,816 feet abruptly from the ocean. Mr. H. T. Wilkinson states that its base is but sixty chains long and twenty-five chains wide. A landing can only be effected, and with the greatest difficulty, on the north-east side.

Three maps of Lord Howe Island are extant. The earliest, by Mr. Surveyor H. F. White, is dated 1835 (Pl. IX). As a separate map this has never appeared, but a reduction was published by Mr. E. S. Hill†. We are indebted to Mr. E. Twynam, Deputy Surveyor-General, for tracings of Mr. White's original chart, and for permission to publish it. The map bears the following title, "Survey of Lord Howe Island, in latitude 31′ 30″ S, longitude 139° E. H. F. White, Assistant Surveyor, 7th January, 1835." It is on a scale of half-an-inch to one mile, and gives the outline of the island in a remarkably accurate manner, especially at the northern end. The map is, however, particularly interesting to the geologist from the statement that the Coral-reef is a "bar of sand," and the entrances one fathom in depth. I shall have occasion to refer to this matter when dealing with the Geology. Mr. Twynam has also furnished us with a tracing of the original chart (Pl. VIII) of Lieutenant Henry Ledgbird Ball, the discoverer of Lord Howe Island. The map bears the following inscription, which is worth quoting:—"There is no danger in approaching Howe's Island. The 'Supply' anchored there in thirteen fathoms sand and coral; but there lies about four miles from the S.W. part of the Pyramid, a dangerous rock which shows itself a little above the surface of the water, and appears not to be larger than a boat. Lieutenant Ball had no opportunity of examining whether there is a safe passage between them or not. The island is in the form of a crescent, the convex side towards the N.E. Two points, at first supposed to be separate islands, prove to be high mountains on the S.W. end, the southernmost of which was named Mount Gower, and the other Mount Ledgbird; between these mountains there is a deep valley which obtained the name of Erskine Valley; the S.E. point was called Point King, and the N.W. point, Point Phillip. The land between these two points forms the concave side of the island, facing the S.W., and is lined with a sandy beach, which is guarded against the sea by a reef of coral rock at the distance of half-a-mile from the beach, through which there are several small openings for boats; but it is to be regretted that the depth of water within the reef nowhere exceeds four feet. They found no water on the island, but it abounds with cabbage palms, mangrove, and manchineal trees, even up to the summits of the mountains. No vegetables were to be seen. On the shore there are plenty of gannets, and a land bird of a dusky brown colour*, with a bill four inches long, and feet like those of a chicken; these proved remarkably fat, and were very good food; but we have no further account of them. There are also many very large pigeons and white birds resembling the guinea-fowl†, which were found on Norfolk Island, were seen here also in great numbers. The bill of this bird is red and very strong, thick, and sharp pointed. Innumerable quantities of very fine turtle frequent this place in the summer season, but at the approach of winter they all go northwards. There was not the least difficulty in taking them. The sailors likewise caught plenty of fish with a hook and line. Ball's Pyramid lies about three leagues S.E. of Mount Gower, and may be seen about twelve miles off, from this there are dangerous rocks, extending about four miles S.E. and S.W., those to the S.W. not showing above water. There are also rocks extending four or five miles from the N.E. and N.W. ends of the islands, which are of a moderate height. Within the N.W. point lies a rock with eleven fathoms water close to it, and there is a passage between it and the island. Mount Ledgbird may be seen about twenty leagues off."

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* H. T. Wilkinson, Geological Report, *loc. cit.*, p. 6.

† *Lord Howe Island, loc. cit.*, frontispiece.

On the reduction of White's map, published by Mr. E. S. Hill, a number of names are given to bays and islands, not on the later maps, and which do not appear to be used now. These, however, are not given by White on his map, but have been taken from Lieutenant Ball's chart. Thus, the North Bay on the latter's chart is called Callam's Bay; the bay now unnamed at the Old Settlement is Hunter's Bay; that portion of the Lagoon impinging on Moseley's Flat is called Prince William Henry Bay; whilst Blenkinthorpe Beach, on the opposite side, is marked Ross' Bay. The island within the Lagoon is spoken of as Blackborne Isle, instead of Goat or Rabbit Island, the names under which it is now known. The Admiralty Islets have the alternative name of Roach Islands, and some advantage would be gained by employing this appellation, as distinguishing these insignificant rocks from the true Admiralty Islands to the north of New Guinea.

A more detailed survey was made by H.M.Ss. "Herald" and "Torch," and the chart published in 1853, on a scale of three inches to a geographical mile. The general execution of this map, as a specimen of cartography, is rough in the extreme, but the interior topography is simply useless. The coast and sea details are, however, given with great exactness. The third map with which I am acquainted, was published in connection with the Hon. J. Bowie Wilson's Report on Lord Howe Island in 1882. This, entitled "Lord Howe Island and adjacent Islets and Reefs," is on a scale of three and a quarter nautical miles to one inch, seems to be an improved edition of the former map as to the execution, with much greater topographical detail. In one particular, however, the two charts do not agree, the heights of the principal elevations. The greatest discrepancy exists between that of Intermediate Hill. In the "Herald" and "Torch" chart the height of this is given as 841 feet, but in the 1882 map as 647 feet, a difference of 194 feet. The latter map was used by Mr. H. T. Wilkinson as the basis of the geological map accompanying his Geological Report on Lord Howe Island in 1882 (Pl. X).

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* Probably *Ocydromus sylvestris*, Sclater.

† The White Galinule *(Notornis alba)* is evidently referred to here.

II.—Geology.

THE general geology of Lord Howe Island is extremely simple, but the details are more complicated. The island consists practically of two formations only—the volcanic rocks forming the general mass, and the stratified beds resting on them. The time at my disposal, through numerous other duties claiming attention, rendered a study of the whole in detail an impossibility, and such a proceeding, indeed, did not come within the scope of my instructions. An examination of the volcanic rocks sufficiently to permit the writing of a memoir on them would occupy much time, and could not safely be performed by one observer. I was not even able to solve many problems connected with the stratified deposits, and other very important points must still remain open, a settlement of which would have materially assisted the conclusions attempted to be drawn from the geology, so far as known to me.

1. *Volcanic Series.*—Two thirds of the island is composed of volcanic rocks, comprising the three isolated masses already mentioned. The only sections visible from the densely wooded nature of the ground, and rounded outline of the eminences, are along the coast, and on the precipitous sides of Mounts Gower and Ledgbird. As seen from the water, the exposed volcanic rocks present a stratified structure, having the appearance of those of sedimentary origin, "but a close inspection shows them to be made up of different horizontal beds of volcanic rock."* In no place is this more apparent than on the westerly faces of Mounts Gower and Ledgbird. An excellent section may be examined by ascending the steep foot of the latter, from the beach, for 300 feet or thereabouts, to the "Lower Road," which runs for a portion of its more accessible course, more or less horizontally parallel with a magnificent exposure of volcanic agglomerate, which is overlain by a vesicular basalt, and this in its turn by an apparently harder stratum of closer texture. So far as measurements with the eye alone can be relied on, these beds appear to be from 15 to 30 feet thick. A somewhat similar succession is again seen at the "Black Rocks," at the west sea-foot of Mount Ledgbird, where a very fine agglomerate is followed by a vesicular basaltic rock. In no part of the island is this stratification seen to better advantage than along the sea face of the North Ridge, as viewed from the water below. There a section, 700 feet high, can be scanned at a glance, showing what certainly appears to be a successive alteration of beds of

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* H. T. Wilkinson, Geological Report, *loc. cit.*, p. 4.

agglomerate, and a harder and denser rock, seamed in all directions by dykes and veins, a number of which are quite vertical, and run up the face of these magnificent cliffs like so many ladders.

The rock so frequently spoken of as an agglomerate consists of a reddish-brown, or otherwise darker base, containing fragments of other volcanic rocks from a few inches in diameter up to a hundredweight. Amongst the best exposures of this rock I may mention the headland immediately to the north of Ned's Beach, and between the Clear Place and Observatory Point on the eastern side of the island. At the former place many of the contained blocks are of an immense size, and, from weathering lighter than the base, give to the whole a remarkable appearance. This agglomerate rests upon a vesicular and somewhat scoriaceous rock full of small crystals.

At the latter locality the agglomerate forms a rugged and dangerous beach, and is here again associated with a scoriaceous basaltic rock and is much traversed by dykes, having a general north-easterly and south-westerly direction. A dense dark greenish-brown basalt also occurs here, but time did not permit me to satisfy myself of its relation to the general series, but it seemed to be an interbedded rock.

This basalt was said to contain tin, and about thirty tons were illegally removed some years since to Auckland, N.Z. It was reported to have yielded 40 per cent. of tin, but on an official assay of the material being made in Sydney it was found to be quite destitute of the metal. As it was still asserted on the island to be stanniferous I brought typical samples away with me, but on treatment in the Geological Survey Laboratory by Mr. J. H. Mingaye, they were again found to be worthless.*

This rock has been petrographically examined by Mr. T. W. Edgeworth David, of the Geological Survey Branch, who finds it to consist of a ground mass of triclinic felspar, granular augite, and dendritic aggregations of magnetic iron, and grains of olivine.

On the east coast of Robbin's Point occurs a light blue or greenish gray basalt, also apparently an interbedded deposit. It contains veins and scattered crystals of iron pyrites, and, according to Mr. T. W. Edgeworth David, is a hard dense diabasic basalt. He believes it to be one of the oldest rocks on the Island. Mr. H. T. Wilkinson states that a somewhat similar rock is met with on the east coast of Boathaven. The pyrites from this locality yielded 3 dwt. 14 gr. gold, and 3 dwt. of silver to the ton. Samples brought from Robbins' Point by myself did not yield either of the metals on assay by Mr. Mingaye.

In a small bay, intermediate between Wilkinson's Promotory and Middle Beach I observed a beautiful exposure of a brick-red volcanic deposit, very much resembling an ash, and forming a moderately high cliff. It was associated with an agglomerate, and traversed by dykes.

The latter form a most important feature in the geology of Lord Howe, and are well worth a study simply in themselves. They were observed varying in width from 6 inches to as much as 18 feet, and many must even be much wider. They are usually denser and finer in texture than the rocks in which they immediately occur, and, as a rule, stand forth like walls, usually weathering into square or oblong blocks, and presenting a somewhat concretionary structure. Excellent examples may be examined at the Black Rocks, at the west sea-foot of Mount Ledgbird; and again the rocky shore of the Lagoon between Boat Pool and North Bay is seamed with them, running in a general direction of N. 130° W. One in particular, on the eastern side of North Bay, is very noticeable, traversing the shore-line just at high-water mark for nearly the whole depth of the bay.

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* For full particulars of this case and the parties concerned, see Legislative Assembly Papers, 1883, No. 11.

At the north-east point of Ned's Beach a cellular basalt occurs, containing augite and olivine. The vesicular cavities are filled with a zeolite, which Mr. David places in the chabazite group. At the same locality there is also present a lateritic amygdaloidal basalt, the amygdules consisting of aragonite.

No traces of any recent lava streams, or other phenomena of the kind, were noticed, nor was a crater observed. It must, however, be borne in mind that the geological examination I was able to make of the volcanic rocks was but a very limited one. Probably the most interesting parts of the island, the extreme southern end and south-eastern portions, were not reached through lack of time, and the same may be said of the north-west headland. If any traces of a crater be ultimately discovered it would not surprise me to find it at or near the peculiar fractured hill previously described under the name of Mount Eliza.

From a microscopical examination of the rock specimens collected by ourselves and Mr. Alexander Morton, Mr. T. W. Edgeworth David concludes that all the Lord Howe igneous rocks belong to the Basalt Group. Those of the diabasic type are probably Pre-Tertiary, and perhaps Palæozoic; whilst the non-diabasic basalts are not older than Tertiary, and some may even be Post-Tertiary. And, finally, that a vast period of time must have elapsed between the eruption of the two.

The only minerals observed were zeolites in the scoriaceous basalt at the northern point of Ned's Beach and at Mutton Bird Point on the east coast.

During Mr. Wilkinson's visit in 1882, the drift in several of the water-courses draining from the mountains was prospected, and no trace of gold or other metallic ore was found.

2. *Red Clay Bed.*—Immediately overlying the volcanic rocks, and between them and the succeeding Coral-sand rock series, occurs a bed of stiff unctuous red or yellow clay. This bed, although exposed in rather inaccessible spots, does not appear to have escaped the notice of Mr. Fitzgerald, who remarks, "The stratified coral passes into a very red clay as it approaches the trap."* The significance of this remark did not strike me until I accidentally came across this clay *in situ.* Its superficial area has not been traced out; but, assuming that it continuously underlies the Coral-sand rock, having been detected at three separate places, its distribution must be considerable. The most important exposure is at one of the small rocky bays on Wilkinson's Promontory, to the east of Ned's Beach. Here the beach, between tide marks, is composed of a coarse volcanic agglomerate. The clay, which is of a chocolate colour and very stiff, is visible in the cliff immediately reposing on the agglomerate and four feet in thickness. In its turn it is overlaid by thick masses of the Coral-sand rock, extending to the summit of the hill.

The next section is visible in Fern Glen, behind Captain T. Nichols' house, where it is a few feet in thickness, but probably less than at Wilkinson's Promontory, and contains fragments of basalt rock. The third exposure which came under my notice was on the low banks of the Deep Creek. Now it is exceedingly probable that a diligent search along the course of the gullies draining the plateau of Mount Lookout and the Deep Creek Valley would bring to light a number of additional sections of this interesting bed. I can only regret that time did not permit of a thorough investigation of this deposit. I am, however, inclined to the opinion that it may be found concurrent with the Coral-sand rock, and that wherever sections can be exposed, showing the junction of this with the volcanic series, then the red clay will perhaps be met with also. So far as my observation went it is unfossiliferous.

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* Hill's *Lord Howe Island, loc. cit.*, p. 44.

3. *Coral-sand rock Series.*—The thin-bedded calcareous rocks included under this name have been deposited either on low basaltic spurs or against the flanks of hills of that nature. For all practical purposes it may be said to form the narrow neck of land uniting the North Ridge with the southern basaltic uplands, except Mount Lookout. Associated with younger deposits it forms all the flat ground of this part of the island and some of the lower hills, such as Wilkinson's Promontory, and extends, in an unbroken sweep, from the Old Settlement on the north to and inclusive of Moseley's Flat on the south. Two other patches exist, one at the head of North Bay and the other in the valley of the Deep Creek. On Mr. Wilkinson's map it is represented at the former locality as forming two horns running up between the hills, the westerly one forming the depression connecting North Bay and the Gulch. I had no opportunity of following out the boundaries in detail, but at the point where the boundary approaches the shore it is most certainly erroneous. This is probably due to the faulty topography of the map, already referred to. The hill-shading at this point represents the slope of the hill as descending to the shore, whereas in reality, immediately rising from the latter is a low hill composed of Coral-sand rock, circumscribed on its other three sides by shallow gullies, which from the boundary line between the Coral-sand rock Series and the volcanic rocks forming the general mass of the North Ridge. On the low rise are situated two caves, excavated in the former. Time did not permit of my following out the boundaries of the second patch, that at the Deep Creek, except at its southern termination along the Fresh-water Pool. Here the Coral-sand rock has, on the map, been carried up the flanks of Mount Ledgbird, but I was quite unable to trace it beyond the creek edge, which again appears to form the boundary.

Mr. H. T. Wilkinson describes the extent and boundaries of the deposit in these words :—" Following the coast line northerly from the western base of Mount Ledgbird, the formation flanking the hills consists of blown sand as far as a point 10 chains south of Robbins' Point, where a basaltic spur from the North Hummock comes down to the sea. From Robbins' Point we have again the blown sand rock, which here forms the central rock of the island between West Beach and Blenkinthorpe Bay. About a mile further north, the west spur from Mount Lookout reaches to the beach, and immediately beyond this the coral-sand rock forms the whole width of the island as far as the north point of Ned's Beach on the east, and Boat Pool on the west. A small area of the sand rock again appears between North Bay and the Gulch."

The only eminences of any importance formed by this deposit are Thompson's Point at the north end of the Lagoon, from 30 to 40 feet high; the cliff at Robbins' on the west flank of North Hummock, about 30 feet; the cliff immediately to the north of the Deep Creek mouth, and above all Wilkinson's Promontory. At each of these spots the Coral-sand rock may be seen in excellent sections, when not obscured by its own *débris*; these will be described separately later.

Over the surface of the lower flat grounds, back from the shore line, this peculiar deposit is met with outcropping in small patches, and forming small scarps along the crests of gentle slopes. Excellent examples of this feature can be seen between the Old Settlement and Thompson's Point, around the residences of Messrs. Wm. Nichols and T. B. Wilson. Even on the low ground of Moseley's Flat such outcrops are visible, proving that although large areas may be hidden by a deposit of soil, or younger alluvium, the Coral-sand rock is not far below. Furthermore, where the soil is deeper and more plentiful, and from the colour of the latter, it would be difficult to assert that the subjacent rock *in situ* would be coral-rock or basalt, pieces of the former are constantly turning up through the operations of the agriculturist.

Lithologically the Coral-sand rock consists of minutely comminuted and completely rounded coral *debris*, with grains of volcanic substances, such as augite, magnetite, and altered lava, with occasional fragments of echinoderm plates and spines, shells, foraminifera, and particles of sand, bound together by a calcareous paste, consisting of a clear crystalline calcite, which does not, however, entirely fill the interstitial spaces, but is sufficient to cement together adjoining grains.[*] The grains are usually white, but sometimes stained yellow, invariably oblong in form, and as a rule, perfectly opaque. So little cohesion is there between the particles, which are of a tolerably uniform size, that it was with the greatest difficulty slides sufficiently thin could be prepared for the microscope. The disintegrated particles have been very carefully examined by Mr. Whitelegge and the writer, and we believe that a large portion are composed of fragments of nullipores, and corallines (calcareous algæ), with a moderate admixture of true coral *débris*. Speaking generally the constituents of the Coral-sand rock agree very closely with the component particles of the present beach sand at Lord Howe. One important feature of the latter, is the paucity of foraminifera. In places the Coral-sand rock becomes very loose, and the particles are easily disintegrated. At other times it is very coherently bound together, and becomes a firm solid rock. The fragments appear to owe their rounded aspect not alone to attrition, but probably partly to the solvent action which yields the crystalline calcite for the partially cementing medium. At least 90 per cent. of the component fragments appear to be comminuted coral and nullipores.

The calcareous condition of this rock is in keeping with that of many other so-called coral "sand-rocks" of comparatively recent origin, but it is not oolitic, and differs from the majority in not having the grains invested by a pellicle or husk of calcite. Thus, at Ascension, and to some extent at St. Helena, in the superficial calcareous deposit there forming, "each rounded particle of shell and volcanic rock can be distinctly seen to be enveloped in a husk of pellucid carbonate of lime."[†] The same phenomenon is seen in the recent coral formation at Norfolk Island,[‡] and numerous other instances could be cited. In the large quantity of coral detritus, which acts as its chief constituent the Lord Howe Coral-sand rock resembles the recent limestone of the Bahamas, but essentially differs from that of Bermuda, which, although calcareous, consists of shells and foraminifera.[§] It is also similar to the blown sands forming the extensive dunes of the South Australian Coast.[||] Touching the deposits at Ascension and Norfolk

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[*] The place of the calcite as a cementing medium is occasionally taken, although not often, by a dark volcanic paste of a similar colour to the included volcanic grains. The structure of this rock has already been described by Mr. T. Davies and the writer, in a paper by Sir R. Owen, "Description of the Fossil Remains of two species of a Megalanian Genus, *Meiolania*, from Lord Howe Island." *Phil. Trans.*, 1887, CLXXVII, p. 497.

[†] Darwin, Geol. Obs. Volc. Islands, 1844, p. 49.

[‡] J. E. Carne, Ann. Report, Dept. Mines, N.S. Wales, for 1885 [1886], p. 145; T. W. E. David, *ibid*, p. 147.

[§] Nelson, Quart. Journ. Geol. Soc., 1853, IX, p. 207.

[||] Ten.-Woods, Geol. Obs. S. Australia, p. 182.

Islands, their description would almost embrace that at our island. Of the former Darwin says:—"Small well-rounded particles of shells and corals, of white, yellowish, and pink colours, interspersed with a few volcanic particles." Mr. Carne's description of the latter is identical, almost word for word.

A simiiar instance of the comingling of volcanic particles takes place in the calcareous sandstone of Rat and Booby Islands, two islets of the Fernando do Norhona Group.*

The Coral-sand rock consists almost wholly of carbonate of lime, four analyses quoted by Mr. H. T. Wilkinson, giving an average of 75 per cent. The following are the details :—

Component Elements.	1	2	3	4
Carbonate of lime	96·5	85·4	95.4	96·4
Phosporic acid	Trace.	Trace.	Trace.	Trace.
Moisture, &c.	3·5	14·6	4·6	3·6
Total	100·0	100·0	100·0	100·0

The specific gravity is 2·452, that of ordinary limestone varying from 2·6 to 2·75.

The consolidation of this rock is undoubtedly due to the percolation of water, whereby carbonate of lime is dissolved, and redeposited on evaporation, as a cementing medium, the agglutination probably going on rapidly. This process is described by the late Professor J. B. Jukes, as taking place at Raines' Inlet,† Great Barrier Reef; and excellently by Professor H. N. Moseley at Bermuda.‡

The stratification is usually very evident, and excellently shown at many places along the shore, particularly in the section at Thompson's Point, the laminæ varying from one to three inches in thickness. At times, however, it is difficult to distinguish either, from the manner in which large and small masses have been tossed about, not, I think, by any convulsions of nature, but simply by the undermining action of the waves and the faces of the sections obscured by *debris*. The Coral-sand rock is particularly susceptible to weathering, and it is even possible to distinguish in large blocks between the effect produced by atmospheric and marine denudation. In the former case very fantastic figures are sometimes produced, pinnacles, ledges, and long reef-like floors and walls, the whole surface being eaten into a minutely vesicular or honeycomb appearance. The inshore escarpments and isolated patches, weather with a much more jagged and broken aspect, the honeycomb appearance giving place to an open cavernous condition. When greatly dessicated by either of these causes, all trace of lamination becomes lost, and this highly broken-up condition renders locomotion exceedingly difficult, and, in the event of a fall, dangerous. Detached portions which have lain about near the cultivations become rounded and waterworn, and the cavities filled with the ordinary red soil of the island, when many strange outlines are produced. These irregular spaces vary from one to six and nine inches in diameter, and perhaps even more. As a rule, when the Coral-sand rock rises in low cliffs at and above high-water mark the foreshore is formed by an ordinary marine platform, flat, with a seaward inclination. Such may be seen on the south side of Prince William Henry Bay. On this Coral-sand rock platform the basaltic pebbles and fragments rolled down from the North Hummock become naturally cemented to the surface of the former. Denudation then setting in, the pebbles afford to the immediately underlying Coral-sand rock a certain amount of protection, and so a small pinnacle is formed, leaving the intruders perched at the top. They resemble so many miniature towers, or *roches perches*, and are either isolated or arranged in curved lines and other fantastic figures, when they give to the beach a very peculiar appearance. Pot-holes are sometimes met with also. Veins and concretionary masses of calcite are not uncommon, excellent examples of the latter being procurable in Fern and Peg-leg Gullies, behind Captain T. Nichols' house.

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* Moseley, Notes by a Naturalist, 1879, p. 79.

† Voyage of the "Fly," 1874, II, p. 339.

‡ Notes by a Naturalist, 1879, p. 20.

I have succeeded, much to my surprise, in distinguishing two distinct periods in this Coral-sand rock Series, separated by a well-marked unconformity. The four best marked sections seen on the island by me are the following; three of them show the two series *in situ*, the third only one. Taking the last first, the following sequence is visible at Thompson's Point, from above downwards:—

1. Disintegrated and perhaps blown sand, intermingled with a little earthy matter, forming the soil, 1 foot.
2. Thin stratum of red soil, containing semi-fossil *Bulimus*, 2 to 3 feet.
3. Coral-rock, thinly laminated, forming the low bluff known as Thompson's Point, and believed to be dipping north, but the face much obscured by fallen blocks and loose sand, 20 to 30 feet.

This section is some fifty yards long, and may be taken as a typical one of the Coral-sand rock when forming low sea cliffs. It will be referred to hereafter in connection with the guano deposit. An equally good but higher section is visible in the cliff to the north of the Deep Creek mouth. This, by barometrical measurement, is 100 feet above the sea-level at the highest point of the cliff, but the bed No. 2 does not appear to be present.

At the outlet of the Deep and Soldier's Creeks the lower division of the Coral-sand rock runs into the Lagoon in long shelves and reefs, much broken up by denudation, leaving isolated patches on the shore quite free of *débris*, and, above all, clearly *in situ*. Here the unconformity is visible, the lower stratification inclined, the upper horizontal, or nearly so, and the lamination in both very thin. The inclination of the lower is 11° in a direction N. 75° E., whilst the upper series when dipping at all is at about 3°, and towards the north.

The following sketch (Pl. VII), in which these features are excellently shown, is taken at the mouth of the Deep Creek,* and also exemplifies the manner in which the long ledges of coral-rock run out, reef-like, into the Lagoon.

From the fact that only portions of the lower series are visible, and the greater part of the upper has been removed by disintegration and marine denudation it is impossible to estimate the thickness. An equally clear and larger section is visible on the east coast in a conspicuous outlier of the Coral-sand rock on the shore near the northern end of Middle Beach, and which has been marked by Mr. H. T. Wilkinson on his map as a volcanic rock. By far the best, and most satisfactory section, however, is that along the south side of Ned's Beach, exposed for about 200 yards, along the cliff of Wilkinson's Promontory, above the beach. Here, whenever the face is clear of vegetation, the junction of the two sets of beds is most distinctly to be seen. Three observations of the lower inclined series gave the direction of the dip as W. 10° N., varying from 25° to 35°, the junction and unconformity being very apparent. The upper series is not, I think, quite horizontal, but has a very gentle inclination eastward and northward. This excellent section brings prominently forward two important points connected with the Coral-sand rock deposit, viz., the constantly changing dip of the lower series, and the approximate greater thickness of the upper. The direction of the dip is here quite different from that observed on the western side of the island, and the steady continuance along such an extent as here shown must be looked upon as exceptional.

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*From a photograph by the Government Printer, taken during Mr. Cloete's expedition.

From the fact that the Coral-sand rock was deposited on the denuded flanks and perhaps summits of pre-existing hills, it necessarily follows that its thickness must be very variable. I am not aware that any excavation has been sunk to prove it, but Captain T. Nichols estimates that, in the neighbourhood of Fern and Peg-leg Gullies, the Coral-sand rock attains a thickness of at least 80 feet. By rough barometrical measurement, the height of the plateau running back from Wilkinson's Promontory was found to be perhaps 250 feet. I traversed this plateau from end to end, and crossed its flanks at various points, and was unable to detect any other form of rock than the Coral-sand rock, and further I believe this to be the greatest altitude to which the latter extends. Allowing the junction of the two series, at Ned's Beach, to be between 30 and 50 feet above high-water mark (say 40 feet), it is not more, we have for the thickness of the upper beds, no less than 200 feet.

In a preliminary investigation extending over but a short time, many difficulties present themselves, which could only be solved by a regular detailed survey. On this ground some of the points now brought forward, will require confirmation. But it may be accepted with confidence that the Coral-sand rock was deposited on the flanks of basaltic islands, of much greater extent than now existing. I believe a break in this deposition occurred, whether partially or wholly so, it is difficult to say, but probably the latter. An unconformity however most certainly exists. Evidence of this, as before stated, is only visible at a few spots, what with the dense vegetation generally clothing the sea faces, and the tumbled condition of the sections. I was much puzzled at first by the everchanging dip, sometimes highly inclined, sometimes horizontal, just as the upper or lower series happened to be within view. By an inspection, however, of the sections described, this peculiarity was explained.

On a low rise, at the head of North Bay small caves are weathered out of the Coral-sand rock. One of these is about forty-five yards long by from twenty-five to thirty yards wide, and some sixteen feet high. The descent, although through an irregular half-choked aperture, is not difficult, and the roof is partially covered with impure stalactites. The second cave had become so much filled by falls that it was not worth or capable of investigation.

The Coral-sand rock is the chief fossiliferous deposit on the island. It has yielded the remains of the interesting reptile, named by Professor Sir R. Owen, F.R.S., &c, *Meiolania*, eggs of turtles, bird-bones, and recent species of both land and marine shells.

Mr. Fitzgerald states that "curious pipes pass through the stratification, which may have been formed by stems of palms; they are hollow at the centre, and the particles of coral are solidified at the circumference, so that at some places they project like short chimney-pots."* Examples of such cylindrical tubes did not come under my notice, but no doubt the description is accurate. The impressions and moulds of trees had long been known in similar deposits, and in many countries. Darwin describes them at King

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* Hill's *Lord Howe Island loc. cit.* p. 45.

George's Sound,* and so does Jukes,† who believed them to be sand stalactites only; Capt. R. J. Nelson, at the Bahamas;‡ and the Rev. J. E. Tenison Woods, in the sand dunes of the South Australian coast.§ The last-named observer combats the arboreal origin of such cavities in the sand examined by him.

Whether the phenomena described by Mr. Fitzgerald are due to the decay of trees entombed, or are analagous to those pipes, which frequently traverse chalk and other similar formations, it is impossible to say without a direct examination.

Guano deposit.—The only exposed outcrop of this observed by myself was at the landing-place, at the northern end of the Lagoon. It forms a bed from ten to fifteen feet thick, and extends along the beach, a little above and between water marks for perhaps thirty yards. Mr. H. T. Wilkinson remarks, "At a point about 20 chains north of Thompson's Point, and cropping out on to the beach is a considerable deposit, consisting of calcareous earth mixed with bird's bones." It is traceable inland, having been proved in sinking wells, but probably occupies only a limited area. No doubt, after the final deposition and upheaval of the Coral-sand rock, the narrow neck of land between the landing place on the west and Ned's Beach on the east, and uniting the North Ridge with the central portion of the island, was occupied by a shallow gut-way. Mr. Wilkinson speaks of a well thirty chains (660 yds.) inland, in which this deposit was sixteen feet thick.

This old well exists in Mr. Thompson's garden, and, through the courtesy of Mr. H. T. Wilkinson, I am able to give the following particulars:—

Sand...	4 feet.
Yellow clay...	14 ,,
Coral sand, passing into "a kind of thick putty mud" of unknown thickness.‖	

Speaking of these wells, Mr. E. S. Hill remarks—"In sinking, occasionally argillaceous beds of fourteen feet in thickness have been cut through; these have been resting on a coral *débris*, and will retain no water."

The position of this deposit is not well defined by any boundaries, but it may occupy the whole of the low ground between the foot of the North Peak Ridge on the north, the Landing Place, and Ned's Beach, east and west; tailing off towards Thompson's house towards the south. That such is the case is probable from further remarks of Mr. Hill's on another well in this neighbourhood, which "was dug nearly through the clay," to a depth of thirty feet. The situation chosen happened to be a kind of basin in which heavy rains collected and there remained till evaporation or percolation relieved the surface. If my supposition relative to the depression is correct, then the so-called "Guano" was deposited on its flanks, and insensibly graduates laterally into the superincumbent layer of loam.

The thickness, I was informed, has been proved to thirty feet, and it does not probably extend to a much greater depth beyond this. The deposit is frequently spoken of as the "Guano"; by Mr. Wilkinson it is called "calcareous earth mixed with bird's bones." For my own part, the deposit appeared to possess a much higher argillaceous than calcareous nature.

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* Geol. Obs. Volc. Islands, 1844, p. 745.

† Quart. Journ. Geol. Soc. 1853, IX, p. 211.

‡ Phys. Structure of Australia, 1850, p. 61.

§ Geol. Obs. S. Australia, 1862, p. 167.

‖ The well could not be sunk lower on account of water, which stands at 18 in., and is not diminished or increased by pumping, or rain.

When seen on the shore it is of a dark ochreous colour, decidedly argillaceous and stiff, containing bird's bones (chiefly *Puffinus*), and pumice.

Mr. Wilkinson gives its composition as 25·1 per cent. of phosphoric acid, equal to ($Ca_3\ P_2\ O_8$) Tribasic Phosphate of Lime.

It will be remembered that the Coral-sand rock contained phosphoric acid up to fourteen per cent., and it is probable that this important and valuable constituent is to some, although small extent, derived from the disintegration of the coral deposit, which is one of its constituents as well as bird remains and exuviæ.

The formation of this phosphatic deposit, which is much too impure to be of any commercial value, is, to some extent, explained by the present mutton-bird rookery at Clear Place Point. Here, where several thousand birds are at work, excavating their burrows, sometimes in the decomposed Coral-sand rock, sometimes in the volcanic soil, intermingled with their bones and droppings, a thin but semi-phosphatic accumulation is going on.

Loam, Soil, and Alluvium.—In many places surrounding the low, scarp-like outcrops of the Coral-sand rock, but more usually covering the latter, is a deposit of loam, forming the soil of the island. It is described by Mr. Charles Moore as of a rich character, being of a dark, unctuous, loamy nature, largely impregnated with humus.* It, however, varies in composition, according to whether derived wholly from the decomposition of the basalt, or that only in part, combined with the decomposed Coral-sand rock. Decayed vegetable matter enters largely into its composition also. The analyses of three different samples are given by Mr. H. T. Wilkinson as yielding phosphoric acid equal to tribasic-phosphate of lime to the extent of 20·1 per cent., 9·1 per cent., and 5·6 per cent. respectively, but neither of these is sufficiently rich for commercial purposes as a manure. By dissolving portions in water, when of a decidedly chocolate colour, a residue of volcanic products is left. As the basaltic rock is receded from, the soil becomes more and more sandy-calcareous, until at last the loamy nature is lost, and it assumes the aspect of a calcareous, sandy soil.

Rich patches of this deposit afford the best garden sites on the island, and it is during gardening operations that the remains of *Meiolania* are usually found, lying loose, having been detached from the nearest rock during its denudation. It is in this way that the irregular holes and spaces so frequently met with in blocks of detached Coral-sand rock become filled as previously described.

I am quite unable to give any precise information as to the depth of this loam, although in places there must be a considerable thickness. It supports a most luxuriant vegetation.

The Old Settlement and Deep Creeks, at their mouths traverse small alluvial flats, formed by the detrital matter brought down by their action, Such accumulations must be regarded as quite distinct from the loam deposit, which is the result of atmospheric action on the rocks immediately underlying, and vegetable decay, and, although both may have been formed more or less concurrently, I have no data on which to base an opinon as to the thickness of these alluvial strata, but it cannot be very great. As in the case of the loam, the flats form excellent agricultural areas.

Under the term "marine alluvium" can only be included the sandy beaches of the Lagoon, Ned's Beach, Middle Beach, and Blenkinthorpe Bay which have already been referred to.

Æolian Deposits.—Along the shore frontage of the Old Settlement, the Lagoon south of Thompson's Point, and Ned's Beach are low sand hummocks, caused by the wind's actions on the beach sand. They extend from high-water mark a short distance inland, and are covered with coarse grass and creepers, whilst a fringe of Thatch Palm (*Kentia Forsteriana*) marks their inland boundary. Ned's Beach is a very good example of this feature. At Blenkinthorpe Beach the sand hummocks are replaced by incipient dunes, which protect the low-lying Moseley's Flat from the inroads of the sea, which would certainly more or less take place were it not for their presence. Speaking broadly, these little dunes are some fifteen or twenty feet above sea-level, inclined with a rather steep slope seaward, and more or less abrupt on the land side overlooking the flat. There are no dunes in the precise and true sense of the word.

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* Hill's *Lord Howe Island, loc. cit.*, p. 17.

Sand and Shingle Beaches.—The sandy beaches have already been referred to in the physical description of Lord Howe. Shingle beaches do not exist; but at the western foot of Mount Ledgbird, and again on the western side of North Bay, a large quantity of coral and basaltic boulders is collected, forming the beach, and piled up along high-water mark in a low terrace.

Land-slips.—At the north end of Ned's Beach masses of basaltic detritus have fallen, or more properly slipped, from the higher eastern flanks of the North Peak. They consist of earth, with stones and blocks of rock, and form low cliffs of limited extent along the waters edge, with a scarf-like front from twenty-five to thirty feet high. This deposit is now in course of destruction by small rivulets coursing through it.

III.—The Geological History of the Island.

Mr. C. S. Wilkinson has remarked* that "great volcanic activity prevailed throughout the Pleiocene period," in what is now known as New South Wales. This remark may be equally well applied to the whole of Central-eastern and South-eastern Australia generally. Sir James Hector similarly says of the Pleiocene in New Zealand †:—"This formation belongs to a period when New Zealand was the mountain range of a greatly extended land area, and when, in the North Island, the volcanic forces had their greatest activity." I believe the more recent geological history of Lord Howe Island may be said to date from this period also. Lying as it does between this continent and the islands of New Zealand, it is but reasonable to suppose that the volcanic activity of one or other of these areas extended in that direction. By an inspection of sounding charts of this part of the South Pacific it will be apparent that a submerged bank, at the depth of about 1,000 feet, extends from New Zealand north-westerly to Lord Howe, but the latter is separated from Australia by deep water. This point has been already briefly pointed out by Alfred Russell Wallace‡, and it is extremely probable that Lord Howe may have been nearly the furthest extension of this old continent in the direction indicated, for, quoting|| Sir James Hector again, "there is no clear evidence of its (*i.e.*, New Zealand) having been connected during Tertiary times with Australia, lying to the westward."

If we now follow up the evidence afforded by soundings, we find a confirmation of these statements in the work performed by the "Challenger"

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* Notes on the Geology of New South Wales, 2nd edit., 1887, p. 85 (4to, Sydney, 1887. Government Printer).

† Handbook of New Zealand, 4th edit., 1886, p. 30.

‡ Stanford's Compendium of Geography and Travel, Australasia, 1879, p. 576.

§ Ind. Col. Exhib., London, 1886, New Zealand Court. Detailed Cat. and Guide to the Geol. Exhibits, 1886, p. 40.

Expedition between New Zealand and Sydney. In the narrative of the voyage* it is said, "From these soundings, it is evident that a bank extends some 200 miles west of Mount Egmont, and may possibly reach Lord Howe Island." Again, "a reference to the general chart seems to indicate that a bank of soundings, of less than 500 fathoms, extends a considerable distance west of the north cape of New Zealand."† This bank is exceedingly well shown on the general chart. Following the track of the "Challenger" from Cook Strait towards Sydney, the first bank beyond the 150-fathom shore line, occurs at depths varying from 275 to 400 fathoms, and extends for about two-thirds the distance in the direction of Lord Howe. The second bank, and apparently that referred to in the previous quotations, ranges to a depth of 1,100 fathoms, and it is on this that Lord Howe stands, the bank extending sufficiently far in a northerly direction to include Middleton Shoal and Elizabeth Reef. Between this 1,100-fathom line and the east coast of Australia occurs the "deep oceanic depression," described by the Rev. W. B. Clarke,‡ and varying in depth from 2,000 to 3,000 fathoms.

How far this old land surface extended to the north it is difficult to say, but a very noteworthy fact presents itself if a chart of this part of the South Pacific Ocean is carefully examined, and the 160th meridian of east longitude followed up from Lord Howe. There, a little to the east of this line, we find soundings at intervals represented by the following shoals going northwards.§

Lord Howe Island	S. lat., 31° 36′ 30″.	E. long., 159° 5′ 10″
Elizabeth Reef	S. lat., 29° 56′ 0″.	E. long., 159° 4′ 50″.
Middleton Shoal	S. lat., 29° 27′ 40″.	E. long., 159° 4′ 17″
Bellona Reefs	S. lat., 21° 47′ 20″.	E. long., 159° 35′ 1″.
Chesterfield Reef & Islets.	S. lat., 19° 58′ 30″.	E. long., 158° 30′ 0″
Bampton Reef	S. lat., 19° 1′ 19″.	E. long., 158° 27′ 3″.

It is therefore possible that an old land connection of Lord Howe with New Zealand may have extended even as far north as the three last reefs off the west coast of New Caledonia. The connection thus shown to exist between Lord Howe and New Zealand is borne out in a very marked manner by some points in the avi-fauna of the former. The birds common to the two, whether species or genera, have already been mentioned (*antea*, p. 17), but the occurrence of so purely a New Zealand genus as *Ocydromus*, and the former existence of the White Gallinule, *Notornis alba* are facts not to be overlooked in a discussion such as the present. The latter bird, as before stated, was known to live on Norfolk Island, and the opinion has even been ventured that this island also was connected with New Zealand. Mr. Wallace referring‖ to the latter, states, "it has probably been much more extensive than it is now, and has included the Auckland and Chatham Islands, and perhaps even at some remote period the Kermadec Group and Norfolk Island." Again, speaking of the birds of Norfolk, he says,¶ "but there are three others which connect this land unmistakably with New Zealand. These are the *Nestor productus*, which formerly inhabited Phillip Island, but is now said to be extinct; a fine parroquet, *Cyanoramphus Rayneri;* and a remarkable white rail, *Notornis alba*. All these are peculiar New Zealand forms, and two of them would be quite unable to pass over any great width of ocean, while the Australian birds are mostly such as fly well, and might easily have emigrated to the island. This sufficiently explains why, although the great majority of its birds are Australian, yet naturalists consider this group of islands to belong really to the New Zealand zoological district."

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* Narrative I, pt. 1, p. 466, Diagram 2, and Physical Chart of the World.

† *Ibid*, p. 467.

‡ Journ. R. Soc. N. S. Wales for 1876 (1877), p. 75.

§ Findlay's S. Pacific Ocean Directory, 1884, 5th Edit., p.p. LIV, and LV.

‖ Australasia, *loc. cit.* p. 564.

¶ *Ibid*, p. 575.

I think, on the whole, therefore, there is reason to believe that Lord Howe Island originally formed a portion of the New Zealand volcanic area, and certainly dates back to the Pleiocene period, perhaps further; but of this we have no definite proof at present, although the diabasic basalts, according to Mr. Edgeworth David, may be Palæozoic, at any rate they are probably Pre-Tertiary. On the other hand his conclusion that all the non-diabasic basalts are not earlier than Tertiary will tend to support the hypothesis suggested here.

Evidence has been adduced to show that Lord Howe formerly consisted of three or more but little separated islands, and, assuming the Coral-sand rock to be of æolian origin, that it was not until after its accumulation that any further depression took place; but these minor changes did not to any great extent alter its configuration from what we now see it, beyond rounding the general contour and deepening the gullies. The separation of portions of its surface one from the other probably conveyed to the mind of Mr. E. S. Hill the expression that, "at one time, it appears to have been a chain of atolls, linked together by the coral insects."* There is not the faintest trace whatever of any condition of things, so far as my own observations went, which could be likened to that of an atoll; nor did any evidence of submergeance other than the facts derived from a study of the Coral-sand rock present themselves to our notice.

A very important statement, however, has been made by Mr. Fitzgerald. When speaking† of the Coral-sand rock he mentions that "it even seems to cap the tops of the mountain." This appeared to me so improbable that I communicated with that gentleman, who very kindly replied as follows:‡—"The first time I went to Howe's Island I did not succeed in reaching the top of the mountain, but was informed that it was composed of the same kind of rock as the low parts of the island (coral), and as it appears to be flat from below, I thought it might be the case; but on my second visit I found that the top was not flat but deeply furrowed, and showing no coral or coral-rock. I refer to Mount Gower, but have no doubt that Lidgbird is exactly the same."

The supposition that Lord Howe, as we now know it, was composed of a few small islets is based on the fact that it would require a depression of but comparatively few feet to return it to this condition. This granted, we have but to imagine a slight upheaval, and circumstances favourable for the accumulation of the Coral-sand rock would at once exist. It is possible that this may have resulted to some extent from the destruction of pre-existing fringing reefs, bearing in mind the formation of the calcareous deposit at Norfolk Island, described by Carne. The destruction of a coral shore invariably gives rise to calcareous sand such as we have now before us. Finally, the presence of nullipores, which play so conspicuous a part in the construction of some reefs, such, for instance, as Keeling Island, must not be overlooked. "There," says Darwin, "the nullipore bed has a thickness of two or three feet, and a breadth of twenty feet."§

When first I examined this deposit *in situ*, I regarded it as of aqueous deposition; but after due consideration of all the facts for and against, I

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[*] Hill's *Lord Howe Island*, *loc. cit.* p. 54.

[†] Hill's *Lord Howe Island*, *loc. cit.* p. 44.

[‡] Letter, dated May 26, 1888.

[§] Dana, Corals and Coral Islands, 1872 (Engl. Edit.), p. 137.

have abandoned this view in favour of an æolian origin. The equal and minute size, and the complete rounding of the particles; the abundance of bird bones and land shells, with the more or less perfect preservation of the latter; and the occurrence of turtle-eggs, is strong confirmatory evidence. Under the influence of wind far more friction takes place than when small particles are triturated in water, and their edges become rounded to a much greater degree, giving rise to the appearance presented by the Coral-sand rock of Lord Howe. The occurrence of such fossils as the above in a similar deposit at St. Helena caused Darwin to ascribe a like origin to it.* On the other hand, marine shells were not frequently observed in the Lord Howe rock, but when present were well preserved, and in some traces of colour were still apparent. The presence of turtle-eggs, although not found in nests as described by Jukes on the islets of the Great Barrier, may still be taken as evidence tending in the same direction; and equally so is the palm impression seen by Mr. Fitzgerald, who says: "In the inclined stratified coral, in one place, very distinct impressions were observed of palm-leaves 10 or 15 feet long."†

Irregular stratification, and false bedding‡ were not observed, although it is often asserted that they are features in æolian rocks; but they are as often seen in aqueous sediments, the result of ever-changing currents. Indeed, it is not imperative that false bedding should be present, because Professor H. N. Mosely mentions the entire absence of it in the calcareous sand-rock at Raine Island.§ He says:—The deposit is "closely similar to that at Bermuda, except that it is remarkably evenly bedded." It would have been much more satisfactory could I have adduced evidence of one of those temporary growth stages of vegetation sometimes met with in æolian deposits, and represented by beds of lignite, or some form of carbonaceous matter. Mr. C. S. Wilkinson has described one in the consolidated sand dunes between the Parker River and Cape Otway, Victoria.‖ Another instance is recorded by Mosely as seen at Bermuda in a dockyard excavation, where a bed of lignite occurs forty feet below sea-level in the sand rock of the island.¶ And lastly, Tenison Woods records an excellent case in connection with the Wide Bay sand hills.** No such instances as these have been seen at Lord Howe, although it is not impossible they may occur.

The balance of evidence may, I think, be said to weigh in favour of the æolian origin of the Lord Howe Coral-sand rock; and it is remarkable how well Dana's description†† of deposits termed by him "Drift Sand-Rock" tallies with it. "Still another kind of beach formation is going on in some regions through the agency of the winds in connection with the sea * * * and proceeds from the drifting of the sand into hillocks, or ridges, by the winds. The drifts resemble ordinary sand drifts, and are often quite as extensive * * * These sand-banks, through the agency of infiltrating waters, fresh or salt, become cemented into a sand-rock, more or less friable, which is frequently oolitic. The rock consists of thin layers or laminæ, which are very distinct, and indicate, generally, every successive drift of sand which puffs of wind had added in the course of its formation." As regards the height to which the Coral-sand rock extends, it in no way exceeds the known altitude of Sand Dunes. I traced it to a level of 200 feet, or more, above the sea, which compares favourably with the height of the dunes along the Cape Otway coast, where Wilkinson* ascertained them to attain 200 feet. Similar dunes were observed by myself about Anderson's Inlet.

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* Geol. Obs. Volc. Islands, 1884, p. 88.

† Hill's *Lord Howe Island, loc. cit.* p. 44.

‡ The dip, although variable, is too steady over considerable areas to represent this.

§ Notes of a Naturalist, &c., 1879, p. 347.

‖ Report on the Geology of the Cape Otway District. Report of the Director, Geol. Survey Vict., June, 1863—Sept. 1864. [1864—65], p. 25.

¶ Notes, *loc. cit.*, p. 21.

** Jour. R. Soc., N. S. Wales, 1882, XVI, p. 60.

†† Corals and Coral Islands, *loc. cit.*, p. 154.

Neither does the dip of the Coral-sand rock, where inclined, exceed that of the known inclination at which blown sand rests. The mean of the dips taken is 28°, whilst, from observations made by Mr. C. S. Wilkinson and myself at Cape Otway, it was found that the faces of the dunes stood at from 30° to 35°.

Having endeavoured to account for the accumulation of the Coral-sand rock chiefly through the agency of the wind, it now becomes necessary to offer some remarks on the apparent unconformity visible between different portions of this deposit. I have to candidly confess that, without a further and more detailed examination, I could not venture on any absolute explanation. It is possible, of course, that after the accumulation of the lower or inclined series (Pl. VII), a partial change of level took place, giving rise to the tilting of the beds, after which the upper or horizontal series was brought together in a similar way to the former. One point, however, is very clear, a submergence took place after the final accumulation of the Coral-sand rock, as evinced by the fact that it now forms the fore shore, and bottom of the Lagoon, and is itself in course of denudation. To bring about the necessary physical change to effect this, a general sinking of the island must have taken place, and it is probable that it is from this period that the present fringing reef dates its origin. A significant fact in support of this is the statement on White's map that the entrances to the Lagoon were only one fathom deep at low water. Now, from the most recent surveys, we find that the water in the two main or navigable channels varies from three and a half to five in the North Entrance, and from four to seven in the South Entrance. If White's soundings are to be depended on it looks as if we were here in face of an historical depression!

To sum up, it may be briefly stated that a marked break occurs in the Coral-sand rock series, but whether this is due to depression and re-elevation or to the known peculiar physical changes which Æolian rocks undergo is not at present clear; that after its final accumulation depression undoubtedly did take place, resulting in the present geological and physical aspect of Lord Howe Island.

To regard the Coral-sand rock as of sedimentary origin is requisite the assumption of a series of changes, for which there is no evidence, including a direct depression of some 200 feet. That no elevation has taken place since the present physical aspect was assumed is, I think, apparent. On some of the Pacific Islands patches and blocks of coral, more or less semi-fossilized, are found at high altitudes, clearly proving that emergence had taken place whilst the present configuration of those islands was in course of formation. Such an instance was observed by Stutchbury, at Tahiti, where on one of the higher mountains he observed a bed of semi-fossil coral.‡ So far as observed, no facts of this nature have been revealed at Lord Howe Island. It is possible that the severance between the latter and New Zealand took place during the subsidence spoken of by Dana—"between the New Hebrides and Australia, the reefs and islands mark out another area of depression which may have been simultaneously in progress."§

R. ETHERIDGE, Junr.

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* Report on the Geology of the Cape Otway District, *loc. cit.*, p. 26.

† Trans. R. Soc. Vict. 1876, XII, p. 3.

‡ Darwin, Geol. Obs. Volc. Islands, p. 28.

§ Dana, Corals and Coral Islands, *loc. cit.* p. 329.

No. 6.

NOTES ON A COLLECTION OF IGNEOUS ROCKS FROM LORD HOWE ISLAND.

BY

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NOTES ON A COLLECTION OF IGNEOUS ROCKS FROM LORD HOWE ISLAND.

Introduction.—The collection comprises about twenty specimens, collected by Mr. R. Etheridge, junr., and Mr. Alexander Morton.

Classification.—All the hand specimens examined belong to the basalt group. They appear to belong to three leading types.—

1. *Basalt with olivine.*—These are chiefly dense dark greenish-gray rocks, for the most part little affected by decomposition, some of them probably being of comparatively recent origin.
2. *Basalt without olivine, lateritic.*—This is a lateritic rock, of a dull brick-red colour, soft, earthy and amygdaloidal; passing in places into scoria. This lava may be partly submarine.
3. *Basalt, diabasic.*—A hard dense pyritous rock of a greenish-gray colour, and resembling an andesitic dolerite; it has undergone extensive alteration, and is probably of considerable geological antiquity.

Detailed Description of Specimens.—Type 1. *Basalt with olivine* [Slide No. 1], from the "Gulch" North Cliff, is a dark-gray cellular basalt, having its joints and steam-holes partly filled with calcite.

On weathered surfaces the rock has a very fresh aspect, and has suffered less, perhaps, from decomposition than any of the other specimens. It outwardly resembles the vesicular basalt No. 6, or (30 a. and b.) north of Ned's Beach, at the Point.

Under the microscope the rock is seen to consist of a microcrystalline base of magnetic iron and granular augite, enclosing micro-porphyritic grains of olivine, occasional zeolites, and a good deal of glassy interstitial material.

The felspars, chiefly triclinic, occur in minute lath-shaped crystals never micro-porphyritic.

Magnetite is abundant, though not present in sufficient quantity to make the base opaque, as in the succeeding section. Ilmenite is also recognizable. Augite is present, only in very minute grains of a pale purplish-brown colour.

The olivine grains are in striking contrast to the rest of the rock constituents. They are much decomposed and of very irregular shape and uneven size, most of them having the appearance of fragments broken off larger grains. All the grains are surrounded by a zone of a reddish-brown decomposition mineral, and the cracks traversing the grains are lined with similar material. Green serpentinous matter is also observable towards the centre of the olivine grains.

The absence of any sign of decomposition or fracture in the rest of the rock, as compared with the much decomposed and fractured state of the olivine, argues a derivative origin for this mineral.

Specimen No. 23 [Slide 2], exact locality unknown.—This is a dense basalt, of a blackish-gray colour on weathered surfaces, very little decomposed, and rendered slightly porphyritic by crystals of augite and grains of olivine. The rock consists of a blackish-gray, rather opaque microcrystalline base of triclinic felspar, and abundant magnetic iron, with porphyritic crystals of augite, felspar, and olivine.

The base contains so much magnetic iron as to be nearly opaque, excepting at the thin edges of the section, and it appears to be wholly devitrified.

The felspars seem to belong to two generations.

The lath-shaped microcrystals with ragged ends in the base were evidently formed during the cooling of the magma, but the porphyritic crystals, to judge from their broken and corroded appearance, were probably formed previously. The latter are colourless and clear.

The augite occurs in minute granules, as a constituent of the base, and also in large well-formed eight-sided prisms bounded by sharp edges. Some of the augite crystals are corroded at the edges and fractured.

The large crystals of augite are not penetrated by the felspar, but completely invest or are moulded on to the grains of olivine.

The large crystals are of a pale-straw colour nearly colourless, with yellowish-brown streaks along the cracks.

The olivine is in rounded grains, partly serpentinized along the cracks into a bottle-green fibrous mineral, rather strongly pleochroic.

The olivine was evidently formed before the consolidation of the base, as proved by its enclosure in the large perfect crystals of augite, which must have formed contemporaneously with the base. In one part of the slide a little secondary actinolite (?) is visible.

Specimen No. 1 [Slide No. 3], from Observatory Point.—This is a dense basalt of a dark greenish-brown to black colour and flakey fracture; it is rich in olivine, the olivine grains bring from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in diameter.

The specific gravity is 3·05.

In microscopic sections the rock is seen to consist of a micro-crystalline ground-mass of triclinic felspar, granular augite, and dendritic aggregates of magnetic iron, and grains of olivine and crystals of augite and triclinic felspar occurring porphyritically.

The grand-mass appears to be wholly devitrified, with the exception of one oval patch in part of the section, which contains a little glass.

The less-decomposed parts of the rock are gray, while those more affected by decomposition are of a reddish-brown colour.

The triclinic felspar in the ground-mass occurs in minute lath-shaped striated crystals.

The larger porphyritic fragments of felspar are much broken and corroded. One of them is moulded on to the side of a large grain of olivine, and in one case some crystals of triclinic felspar are completely invested by a large crystal of augite.

The augite occurs in the ground-mass in microscopic granules, and also porphyritically. The large augite crystals have been much eaten away, like the large felspars. Magnetic iron occurs in the base in black crystalline aggregates, and also in single crystals, showing as opaque black squares and triangles.

Ilmenite is also present, in well-marked rhombohedral sections.

The olivine in this basalt is quite clear and transparent, and remarkably free from decomposition, excepting along the cracks, and around the margins where it has decomposed into a reddish brown mineral, which has lent a similar colour to the rock, when viewed in thin sections by transmitted light.

This reddish-brown secondary product is probably formed partly from the magnetic iron, but its presence is most marked close to the olivine grains.

A little greenish decomposition mineral is also observable in the gray parts of the base. This probably results from the alteration of the granular augite into chlorite.

Specimen 35, from north-east point of Ned's Beach, is a cellular basalt slightly porphyritic by augite. The gas-pores are lined or completely filled with a white transparent zeolite. The weathered surfaces of the rock show that it is composed of a greenish-brown ground-mass speckled with rust, (formed by decomposition of magnetite) and containing black crystals of augite from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in length, a few crystals of striated triclinic felspar $\frac{1}{2}$ inch long, and reddish-brown, partly decomposed, grains of olivine.

The zeolite has a hardness of about 4, and a specific gravity of about 2·16.

Before the blow-pipe it whitens, crumbles, and swells up considerably into white semi-transparent beads.

It probably belongs to the Chabazite Group, and resembles phacolite.

Type 2: *Basalt without olivine. Specimen* 25 [Slide No. 4 *a.*], from North Point, Ned's Beach.—This rock is a much decomposed lateritic amygdaloidal basalt, of a reddish-purple colour. The rock is soft enough to be cut with a knife without much difficulty. The amygdules consist chiefly of a pale greenish-gray aragonite.

The rock, examined in thin sections under the microscope, is seen to consist of a microcrystalline ground-mass of lath-shaped felspar too cloudy to polarise, a feebly translucent brown mineral, a pyroxenic decomposition product filling in the spaces between the microscopic felspars, and crystalline aggregates or individual crystals of hæmatite pseudomorphous after magnetic iron. Crystals of a mineral resembling nosean (though possibly a variety of pyroxene), $\frac{1}{16}$ inch to $\frac{1}{8}$ inch in diameter, are plentifully distributed throughout the ground-mass.

The sections afforded by this mineral are generally six-sided, and occasionally quadratic.

Most of the crystals are bounded by an opaque zone of hæmatite, and the greater part of the space so enclosed is reticulated with pseudomorphs of hæmatite after magnetite. One crystal in particular shows the characteristic zonal grouping of the enclosures remarkably well.

Between the opaque hæmatite grains in the nosean (?) crystals is a semi-translucent yellowish oily mineral, which has evidently resulted from the alteration of the nosean (?).

Small and large amygdules also occur of a mineral somewhat similar in appearance, of a pale greenish-yellow colour. The large amygdules have a hardness of about $3\frac{3}{4}$, are infusible before the blow-pipe, and effervesce briskly in hydrochloric acid. They are evidently aragonite.

The advanced state of decomposition of the only small specimen of this rock available for examination precludes the possibility of the certain determination of the nosean-like mineral.

Specimen No. 10 (34), from the west side of Thompson's Beach, is a purplish-red scoria, perhaps a scoriaceous representative of the preceding rock.

Type 3: *Diabasic basalt. Specimen* 24, [Slide No. 5 *a*], from beach below Robbins' House.—This is a hard, dense, dark greenish-gray rock, irregularly jointed. The weathered surfaces are pitted with small hollows, and in places small beads of chalcedony $\frac{1}{16}$ inch in diameter form minute excrescences. White and dark-green spots are visible on freshly-broken surfaces. Some of these white spots are very soft, and effervesce strongly in hydrochloric acid; others are hard, and cannot be scratched with a steel penknife. The dark-green spots are aggregates of iron pyrites and epidote. Iron pyrites is present in crystals and crystalline aggregates disseminated through the mass of the rock, and also lining the irregular rock-joints, in films $\frac{1}{50}$ to $\frac{1}{20}$ of an inch thick. At times calcite takes the place of this interstitial pyrites in the joints, as pointed out to me by Mr. F. Ratte, Mineralogist to the AustralianMuseum.

The specific gravity of this rock, taken in water at 80° Fah., is 2·822 for average specimens, and 2·838 for the more pyritous.

Under the microscope the rock is seen to be holocrystalline and composed of a microcrystalline ground-mass doleritic in places with microporphyritic crystals of augite and amygdules of chalcedony and calcite. The ground-mass is formed of lath-shaped triclinic felspar, granular augite, a grass-green secondary mineral, chiefly epidote, magnetic iron, and secondary iron pyrites. The structure of the felspar and granular augite is subophitic, and decidedly ophitic in the case of the microporphyritic crystals of augite.

The felspars, with few exceptions, are sufficiently free from decomposition to show distinct multiple-twinning. They penetrate the augites deeply without interfering with the orientation of the crystal. In one part of the slide they exhibit a zonal tangential arrangement around a microporphyritic crystal of colourless multiple-twinned felspar.

A few microporphyritic crystals of felspar are observable, several of which have been fractured in situ, and the broken pieces considerably displaced with regard to one another. The augite in the ground-mass is of a pale yellowish-gray tinge, inclining in places to pale purplish-brown. Towards the margins most of the augites are decomposed into a grassy-green epidote. The microporphyritic augites are intercrystallized with the lath-shaped felspars. They show no signs of decomposition, and polarise brilliantly. One large crystal, however, is in striking contrast to the others, being almost wholly decomposed into a greenish mineral. The green secondary minerals probably result from the decomposition of the augite, as shown by the gradual merging of the latter mineral into the former, and the ophitic structure of this green mineral with the felspars. Tested with the single nicol most of the green mineral shows pleochroism, but not so strongly as hornblende. In a few instances this green mineral is somewhat fibrous, and shows a strong parallel cleavage in one direction. Acicular crystals of actinolite (?) traverse some of the green patches, and sometimes show a radiate arrangement. Chlorite is not definitely recognizable, and there is no evidence of the existence of primary hornblende.

Magnetite is present in the base and in the microporphyritic crystals of felspar and augite. A few large grains of ilmenite are recognizable from the fact that they are surrounded by rings of cloudy pale yellowish-gray leucoxene.

Opacite is plentiful, occurring in elongated shapes.

SUMMARY.

The chief conclusions to be derived from the preceding observations would appear to be the following :—

(1.) All the igneous rocks of Lord Howe Island (so far as represented by the collection examined) belong to the Basalt Group.
(2.) A vast period of time must have elapsed between the eruption of the diabasic basalt and that of the comparatively recent olivine basalt.
(3.) All the basalts, with the exception of the diabasic types, are probably not earlier than Tertiary, and some may be Post-Tertiary.
(4.) The diabasic basalt is probably Pre-Tertiary, and may be Palæozoic.

T. W. EDGEWORTH DAVID.

[Plates.]

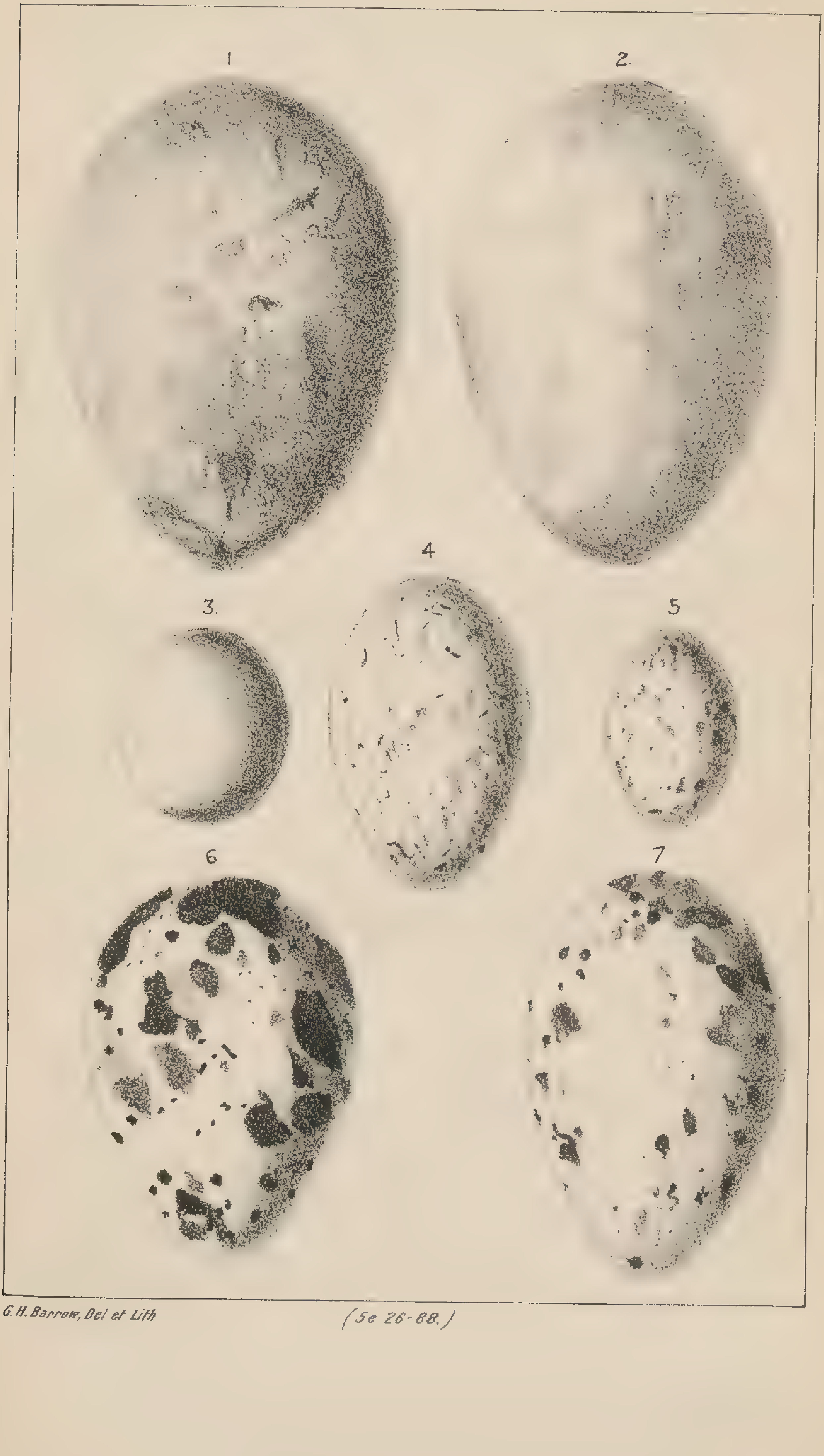
Sydney : Charles Potter, Government Printer —1889.

EXPLANATION OF PLATE I.

Fig. 1.—Phæton rubricauda, Bodd.
Fig. 2.—Sula cyanops, Sundevall.
Fig. 3.—Halcyon vagans, Lesson.
Fig. 4.—Anous cinereus, Gould.
Fig. 5.—Aplonis fuscus, Gould.
Fig. 6.—Sterna fuliginosa, Gmelin.
Fig. 7.—Anous stolidus, Linnæus.

The figures are all of the natural size.

PLATE 1.



G. H. Barrow, Del et Lith

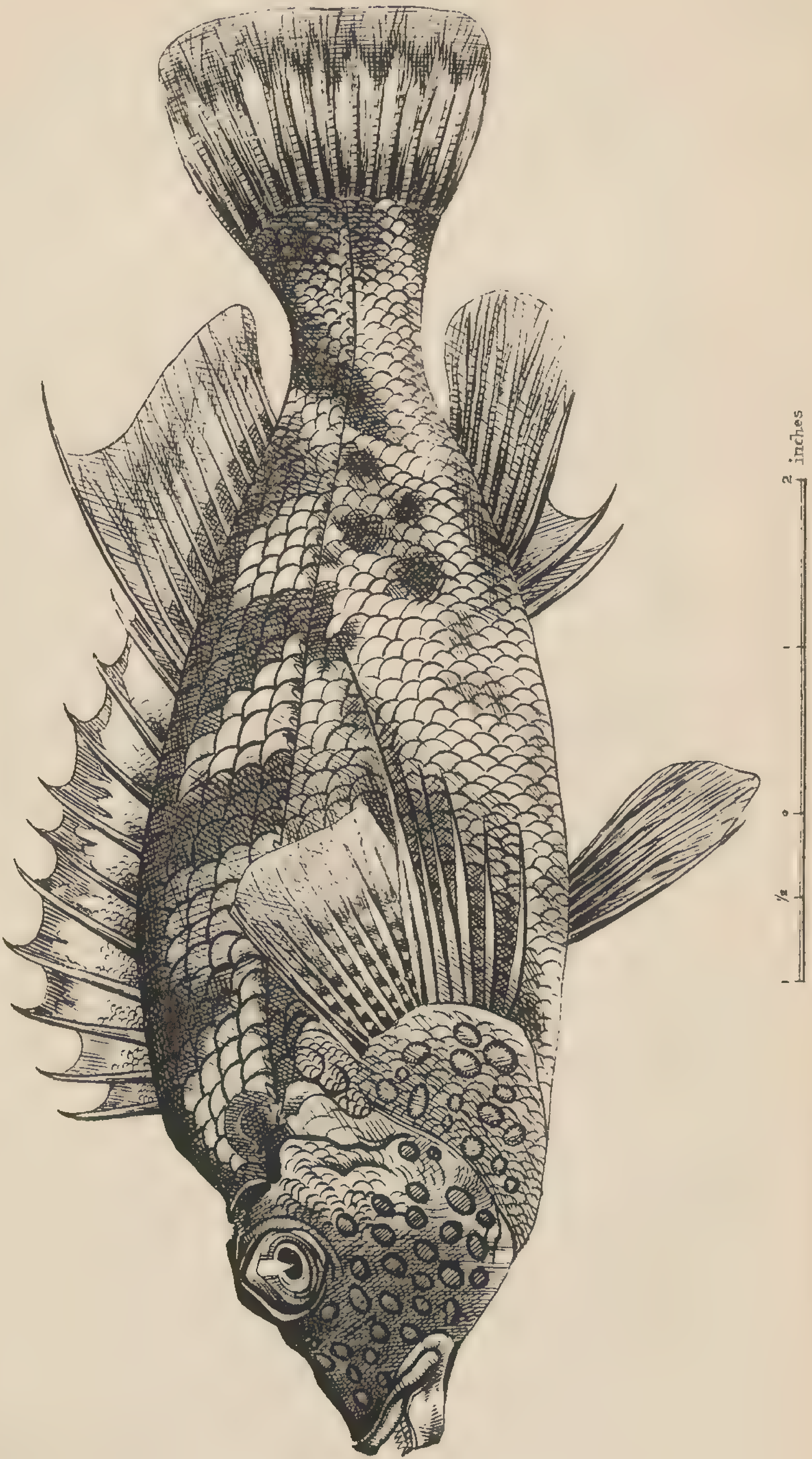
(5e 26-88.)

EXPLANATION OF PLATE II.

Cirrhitichthys splendens, Ogl.

$\frac{4}{5}$ nat.

PLATE 2.



H Irwin, Del, G.H.Barrow, Lith

(e 26-88)

EXPLANATION OF PLATE III.

Fig. 1.—Pempheris Unwinii, Ogl.
Fig. 2.—Chætodon aphrodite, Ogl.
Fig. 3.—Acanthoclinus fasciolatus, Ogl.
Fig. 4.—Solea Ramsaii, Ogl.
Fig. 5.—Tetrodon callisternus, Ogl.

The figures are all of the natural size.

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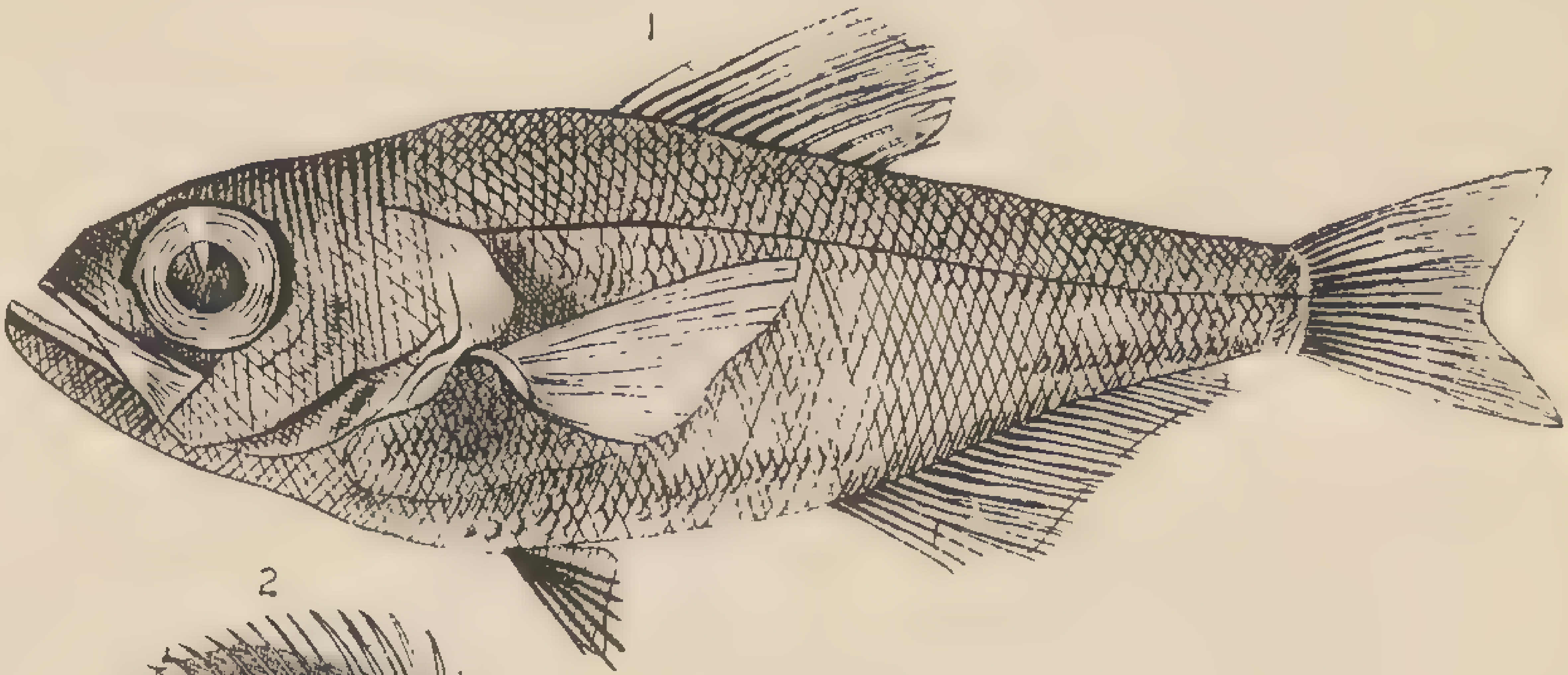

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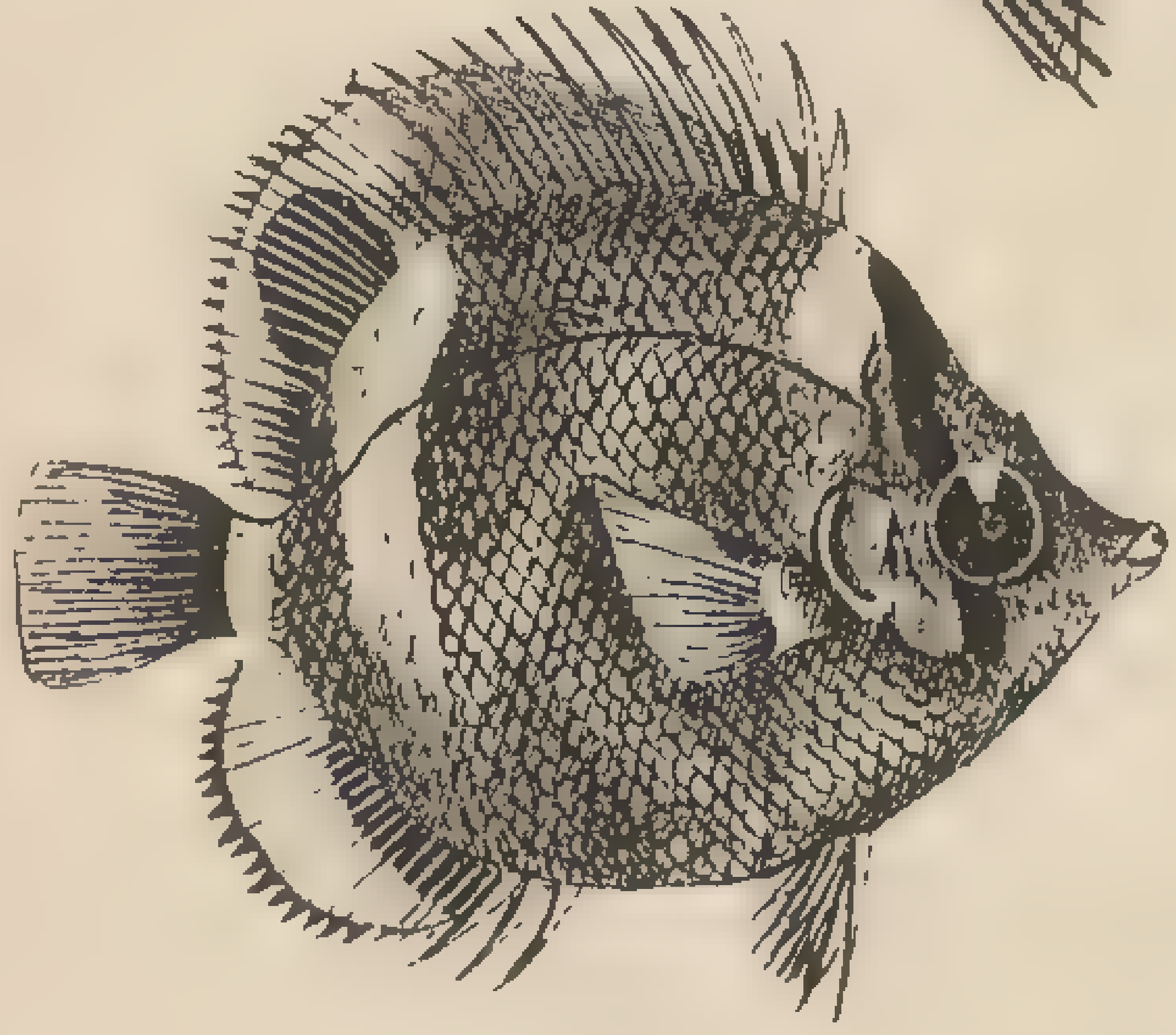

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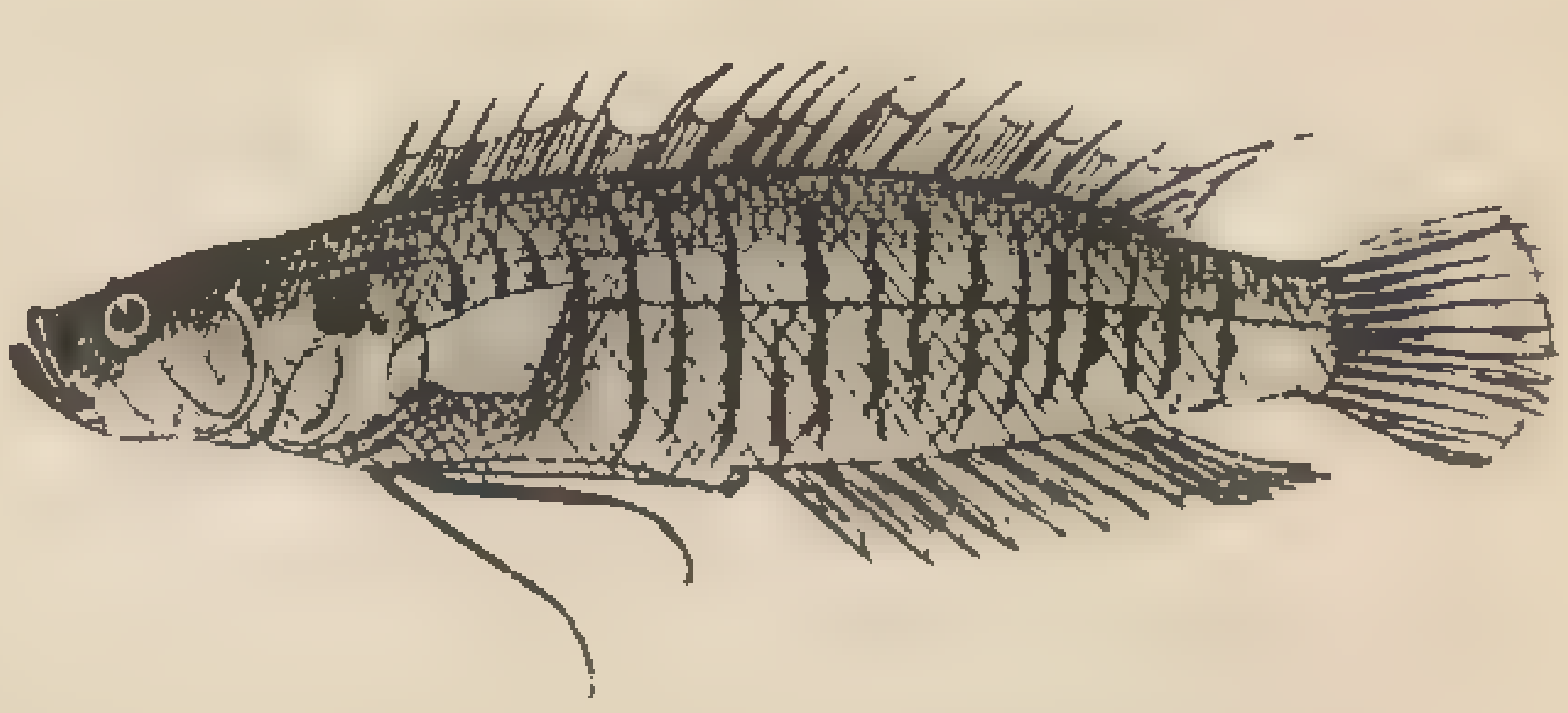

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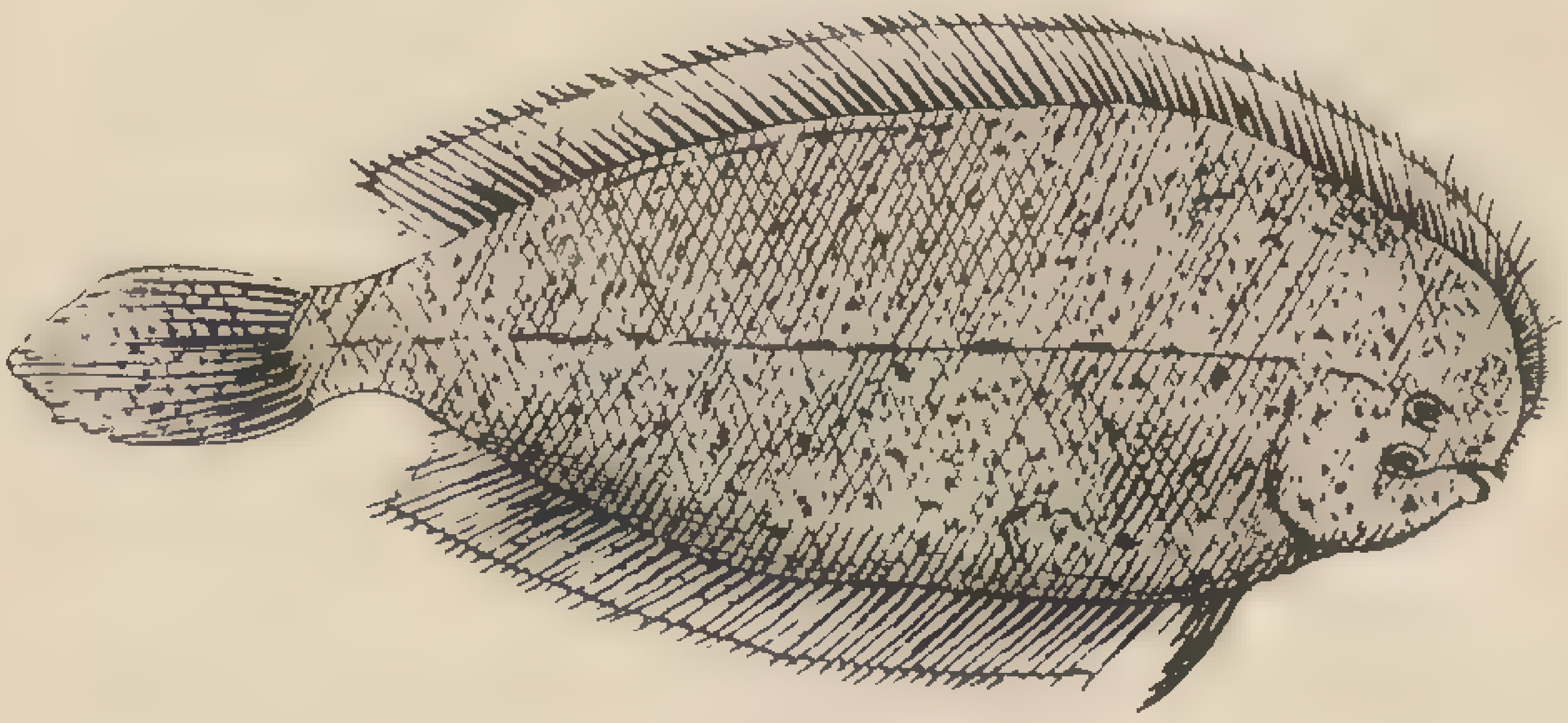

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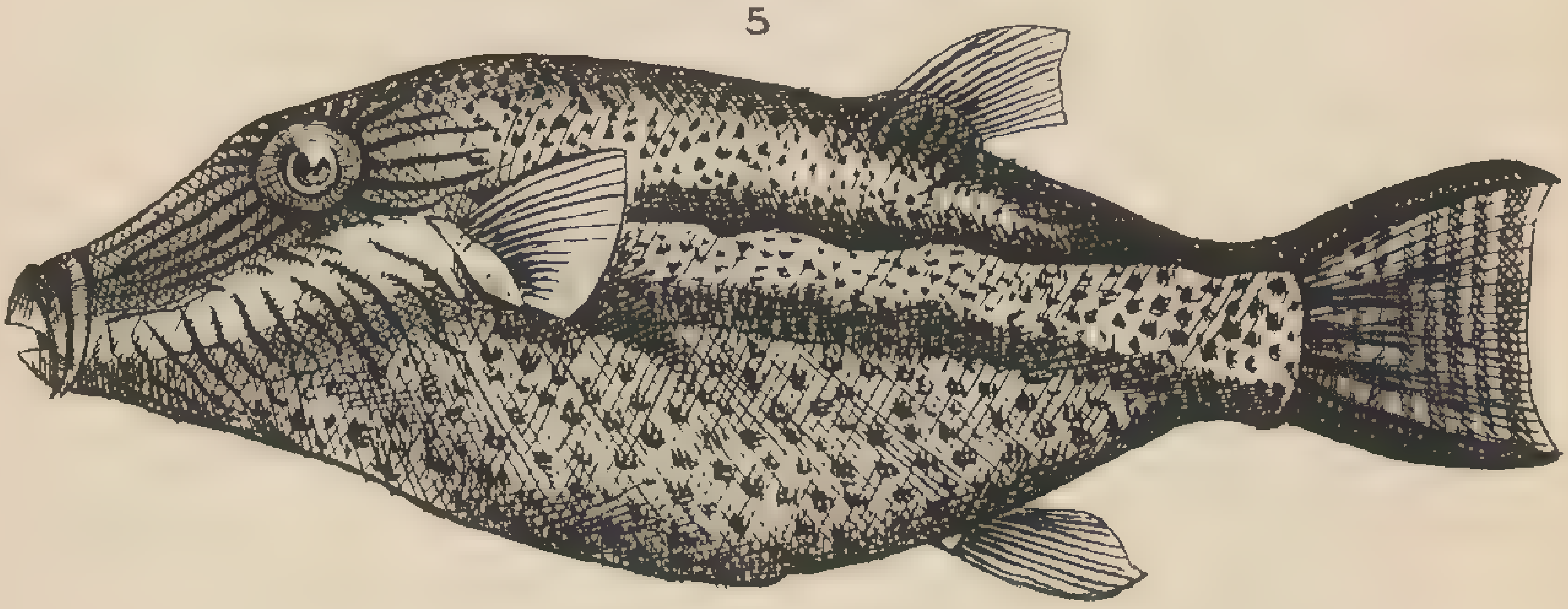


H Irwin, Del, G.H Barrow, Lith. (5e 26–88)

EXPLANATION OF PLATE IV.

Figs. 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 21, 22.—Purpura (Polyptropa) Smithi, Brazier.

Figs. 5, 6.—Helix (Patula) Unwini, Brazier, × 4.

Figs. 13, 14, and 26.—Helix (Rhytida) Balli, Brazier, × 2.

Figs. 15, 16.—Bythynella Ramsaii, Brazier, × 3.

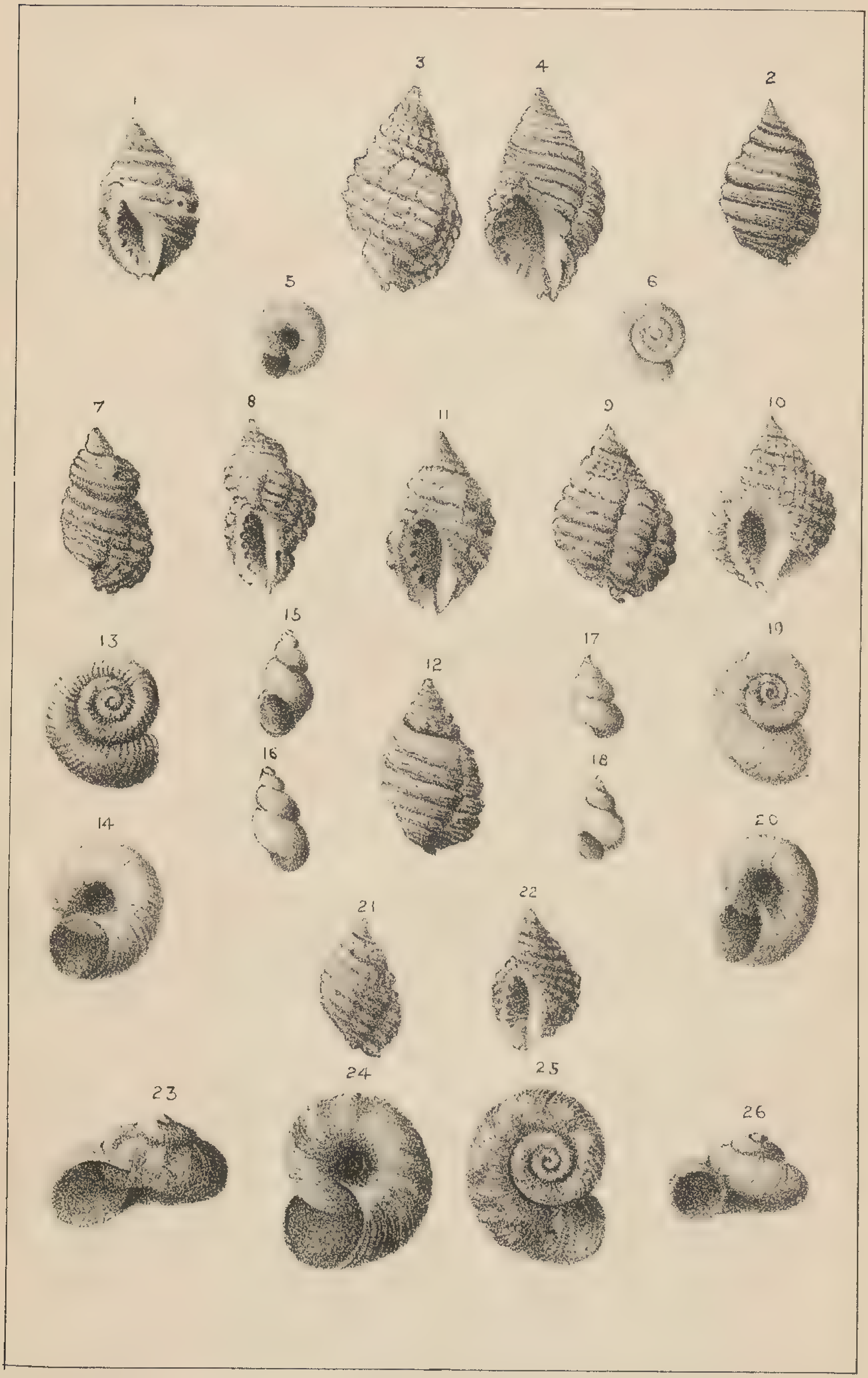
Figs. 17, 18.—Bythynella Whiteleggei, Brazier, × 4.

Figs. 19, 20.—Helix (Rhytida) Ledgbirdi, Brazier.

Figs. 23, 24, 25.—Helix (Rhytida) Whiteleggei, Brazier, × 2.

Unless otherwise stated the figures are of the natural size.

LORD HOWE ISLAND: REPORT.   PLATE IV



G.H Barrow, Del et Lith.   (5e 26-88)

EXPLANATION OF PLATE V.

Figs. 1, 2, 7, 8.—Bulimus (Eurytus) Etheridgei, Brazier.

Figs. 3, 4.—Helix (Charopa) Wilkinsoni, Brazier, × 6.

Figs. 5, 6.—Nanina (Hemiplecta) Sophiæ, var. conica, Brazier, var.

Fig. 9.—Vitrina (Parmella) Etheridgei, Brazier, × 2.

Unless otherwise stated the figures are of the natural size.

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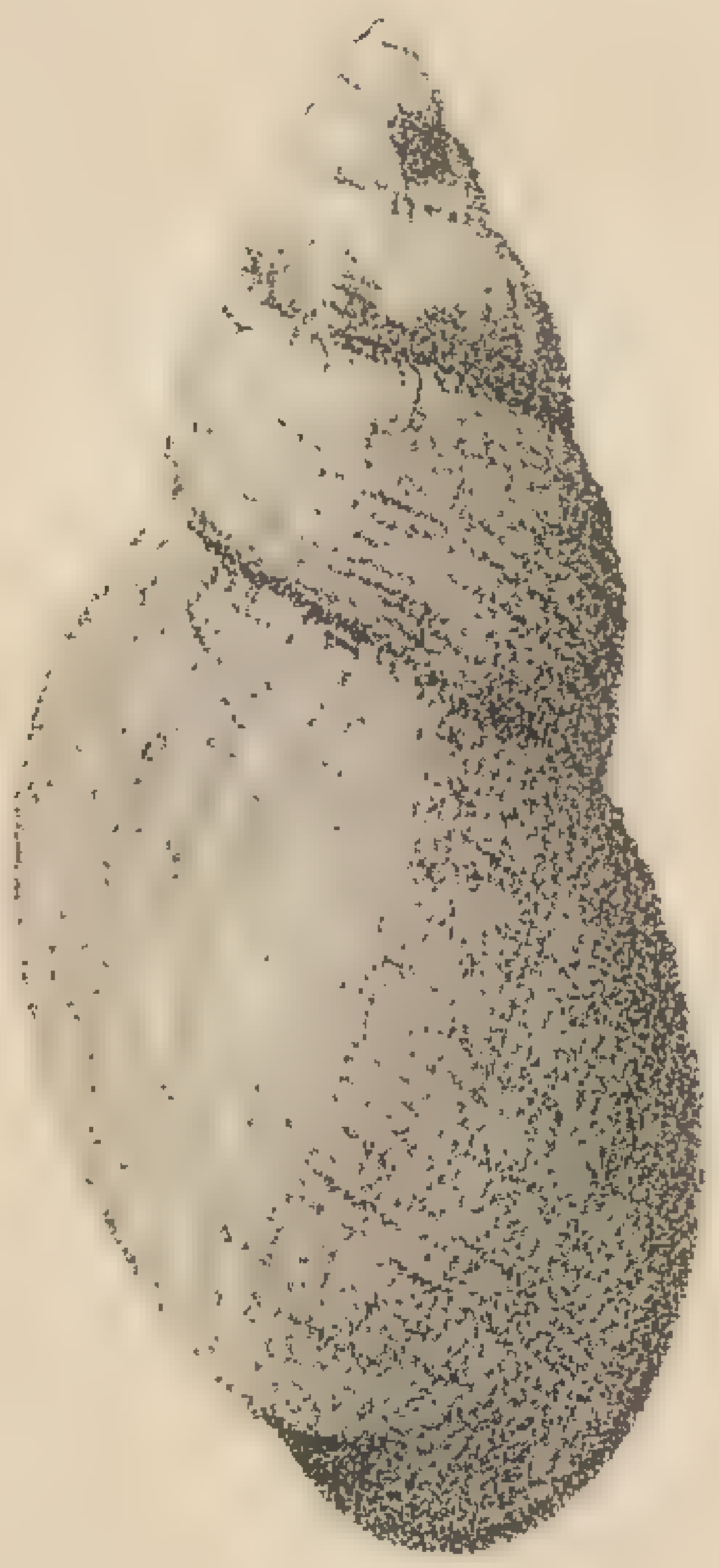

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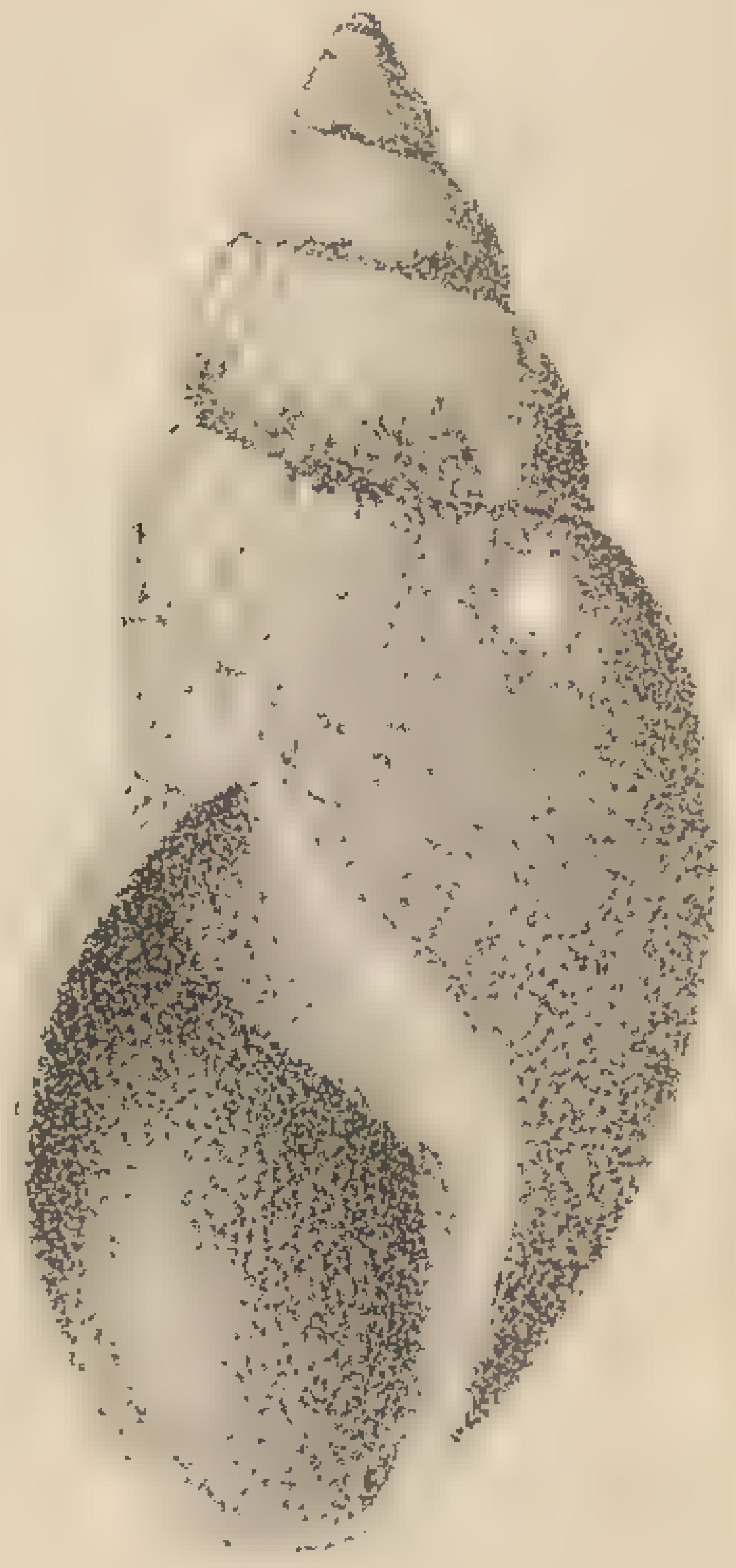

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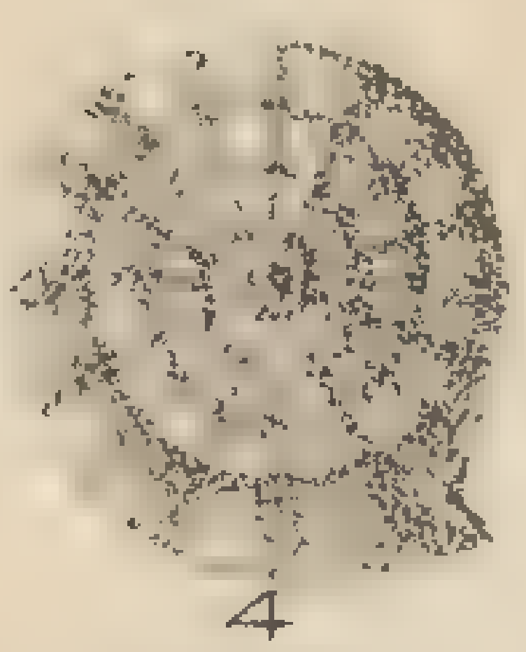

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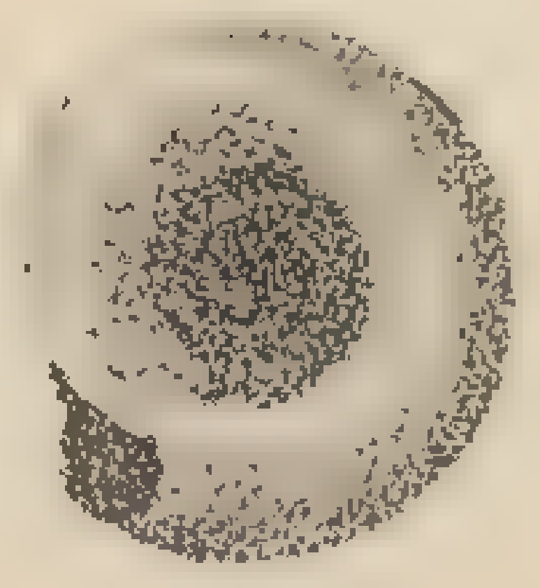

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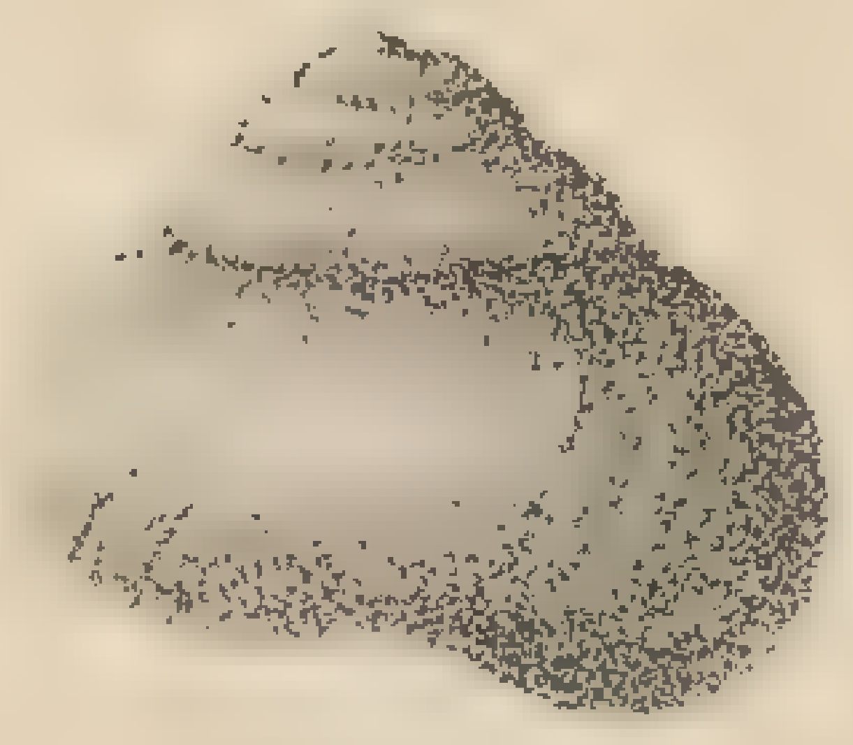

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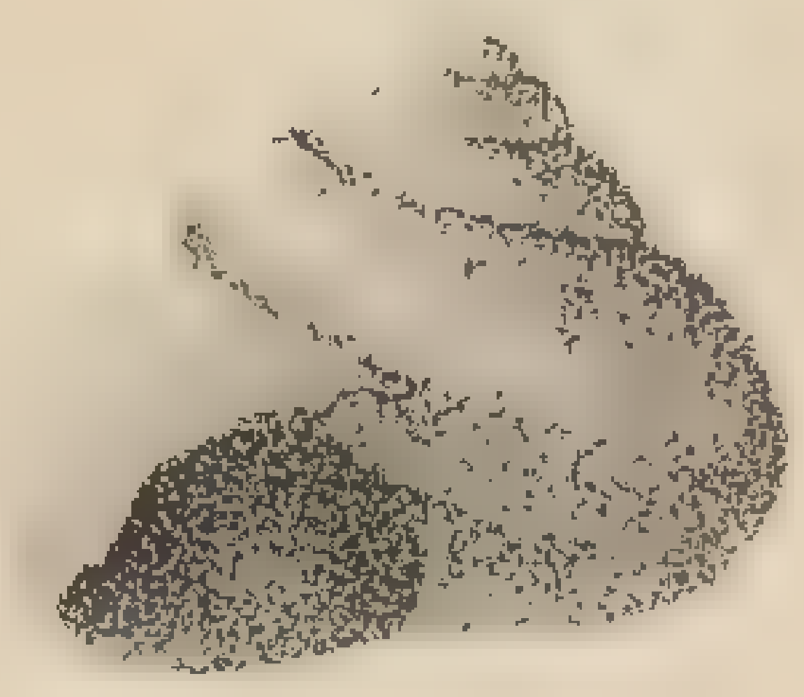

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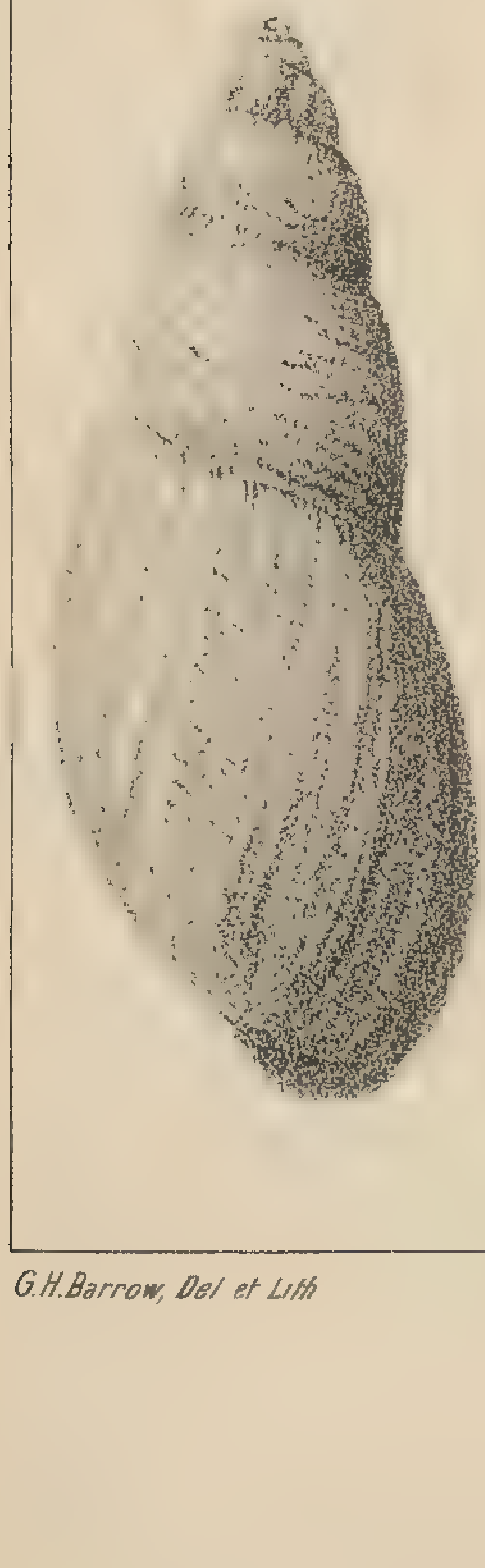

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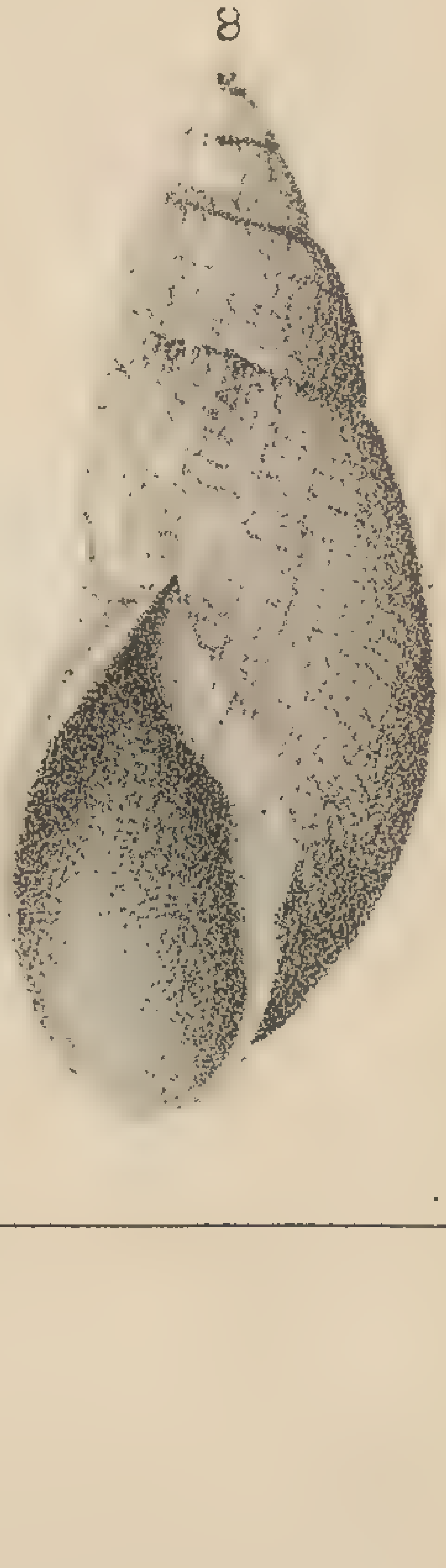

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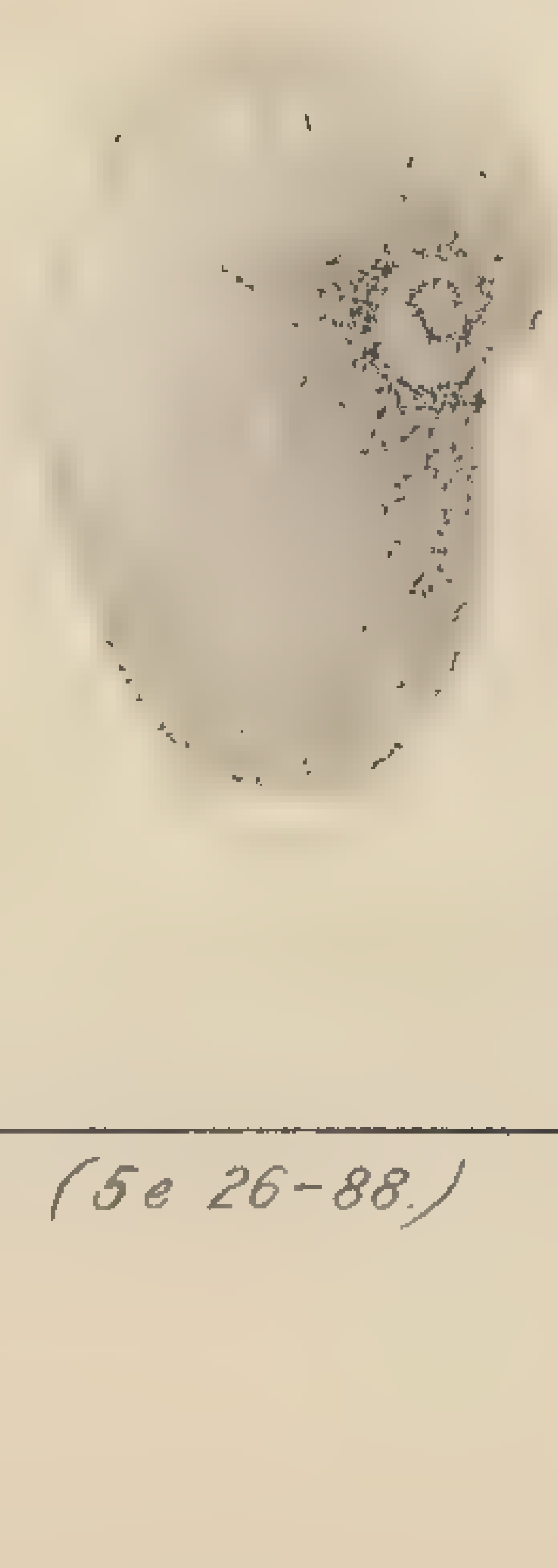
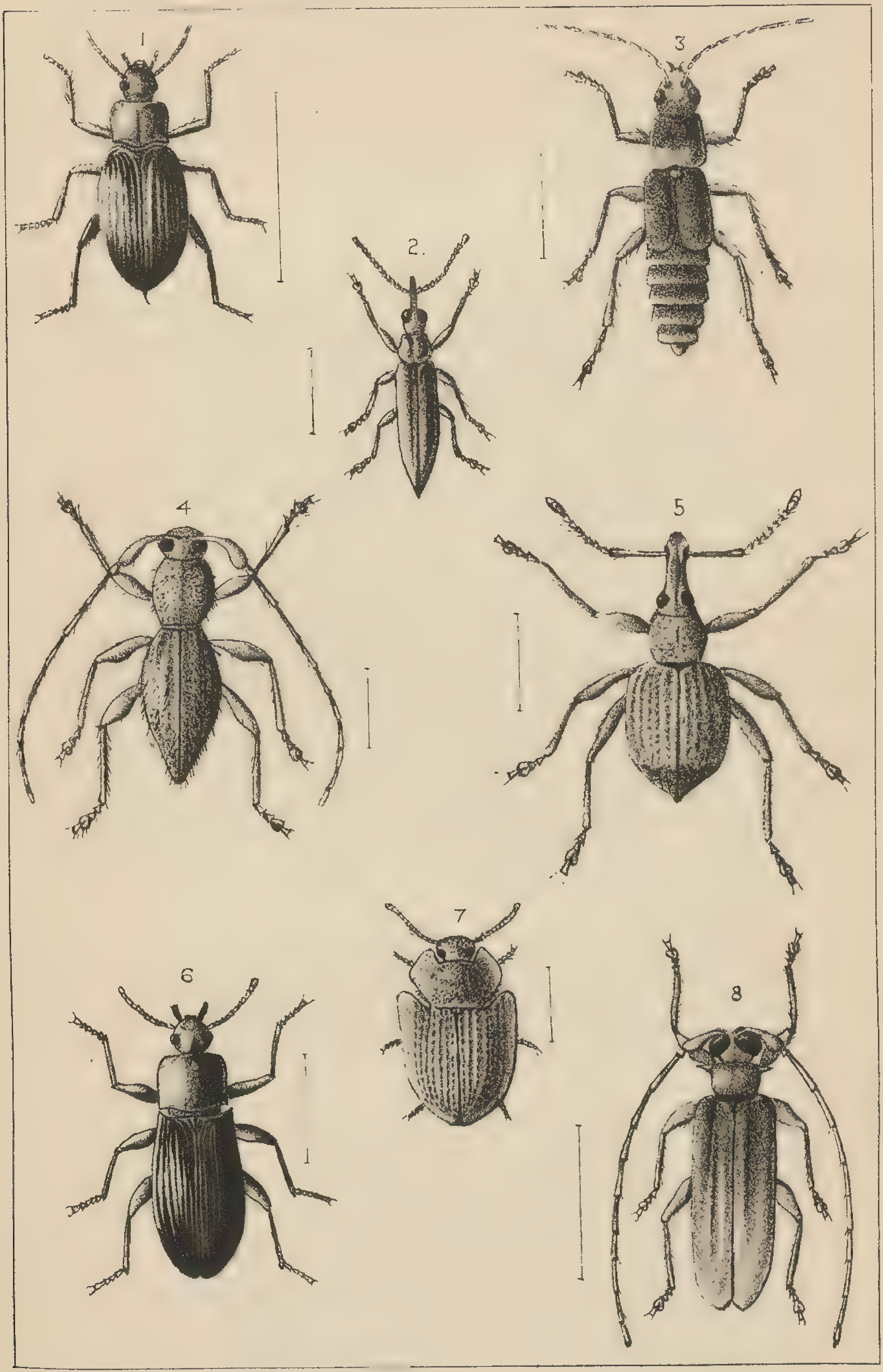


G.H.Barrow, Del et Lith (5e 26-88.)

EXPLANATION OF PLATE VI.

Fig. 1.—Nyctobates sterrha, Oll.
Fig. 2.—Belus acrobeles, Oll.
Fig. 3.—Telephorus apterus, Oll. (female).
Fig. 4.—Somatidia pulchella, Oll.
Fig. 5.—Leptops Etheridgei, Oll.
Fig. 6.—Meneristes vulgaris, Oll.
Fig. 7.—Ostoma pudicum, Oll.
Fig. 8.—Howea angulata, Oll. (female).

The natural sizes are shown by indicators.



G.H.Barrow, Del et Lith.

(5e 26-88).

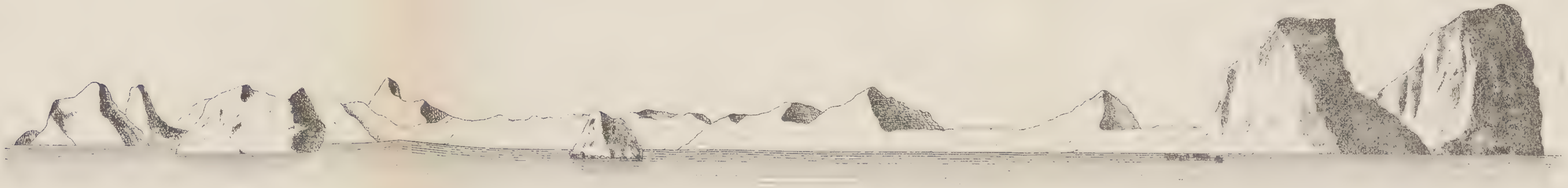
EXPLANATION OF PLATE VII.

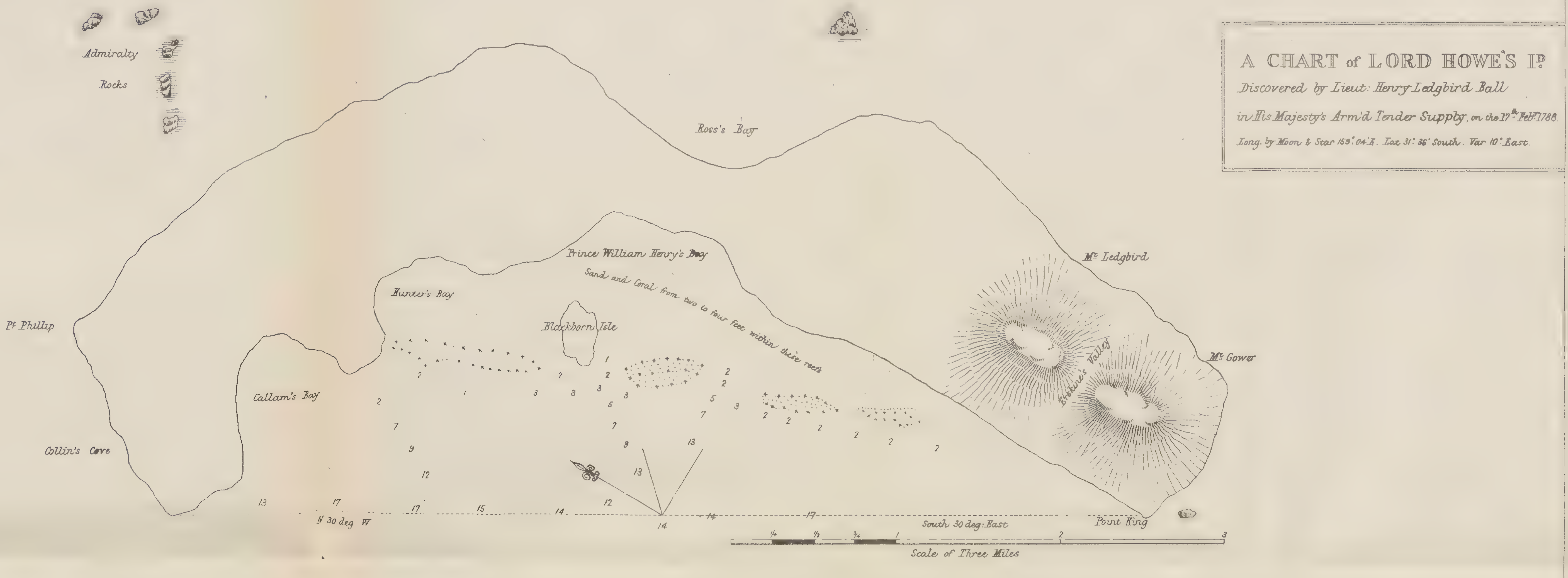
Sketch-section of the Coral-sand rock at the mouth of the Deep Creek, showing the lower inclined and upper horizontal series, both now in course of denudation. From a photograph by the Government Printer.

PLATE VII.

(5e 26—88)

A VIEW of LORD HOWE'S ISLAND





A CHART of LORD HOWE'S Id.

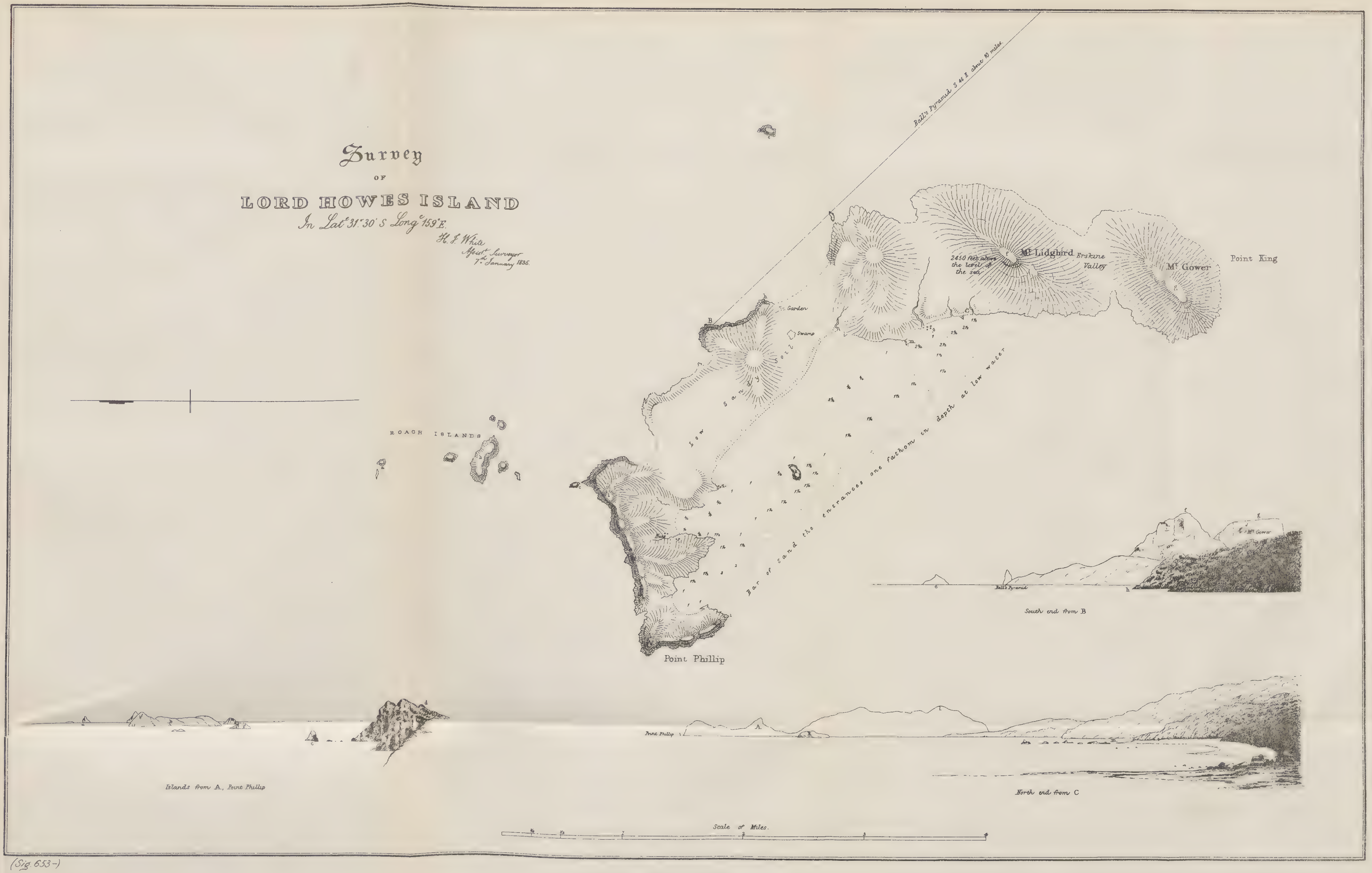
Discovered by Lieut: Henry Ledgbird Ball
in His Majesty's Arm'd Tender Supply, on the 17th Feby 1788.
Long. by Moon & Star 159° 04' E. Lat 31° 36' South. Var 10° East.

"There is no danger in approaching Howe's Island. The Supply anchored there in thirteen fathoms sand and coral; but there lies about four miles from the S.W. part of the Pyramid a dangerous rock which shews itself a little above the surface of the water and appears not to be larger than a boat. Lieut: "Ball had no opportunity of examining whether there is a safe passage between them or not. The Island is in the form of a crescent, the convex side towards the N.E Two points at first supposed to be separate islands prove to be high mountains on the S.W. end, the southermost of which was named Mt "Gower, and the other Mt Ledgbird; between these mountains there is a deep valley which obtained the name of Erskine Valley; the S.E. point was called Pt King and the N.W point Point Phillip. The land between these two points forms the concave side of the Island facing the S.W. and is lined with a sandy "beach, which is guarded against the sea by a reef of coral rock at the distance of half a mile from the beach, through which there are several small openings for boats; but it is to be regretted that the depth of water within the reef nowhere exceeds four feet. They found no water on the Island, but it abounds "with Cabbage Palms, Mangrove and Manchineal trees, even up to the summits of the mountains. No vegetables were to be seen On the shore there are plenty of gannets, and a land bird of a dusky brown colour, with a bill four inches long and feet like those of a chicken: these proved remarkably fat "and were very good food; but we have no further account of them. There are also many very large pigeons and white birds resembling the guinea fowl which were found on Norfolk Island were seen here also in great numbers. The bill of this bird is red and very strong, thick and sharp pointed. Innumerable "quantities of exceedingly fine turtle frequent this place in the summer season, but at the approach of winter they all go northward. There was not the least difficulty in taking them. The sailors likewise caught plenty of fish with a hook and line" Ball's pyramid lies about three leagues S.E. of Mt Gower and may be seen about twelve leagues off, from this there are dangerous rocks extending about four miles both S.E. and S.W., those to the S.W. not showing above water. There are also rocks extending four or five miles from the N.E. and N.W. ends of the Island which are of a moderate height Within the N.W. point lies a rock with eleven fathoms water close to it, and there is a passage between it and the Island. Mt Ledgbird may be seen about twenty leagues off.

W. Sydney 8 march 1881

(Sig 5e26-88)

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,
SYDNEY, NEW SOUTH WALES.



(Sig 653-)

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,
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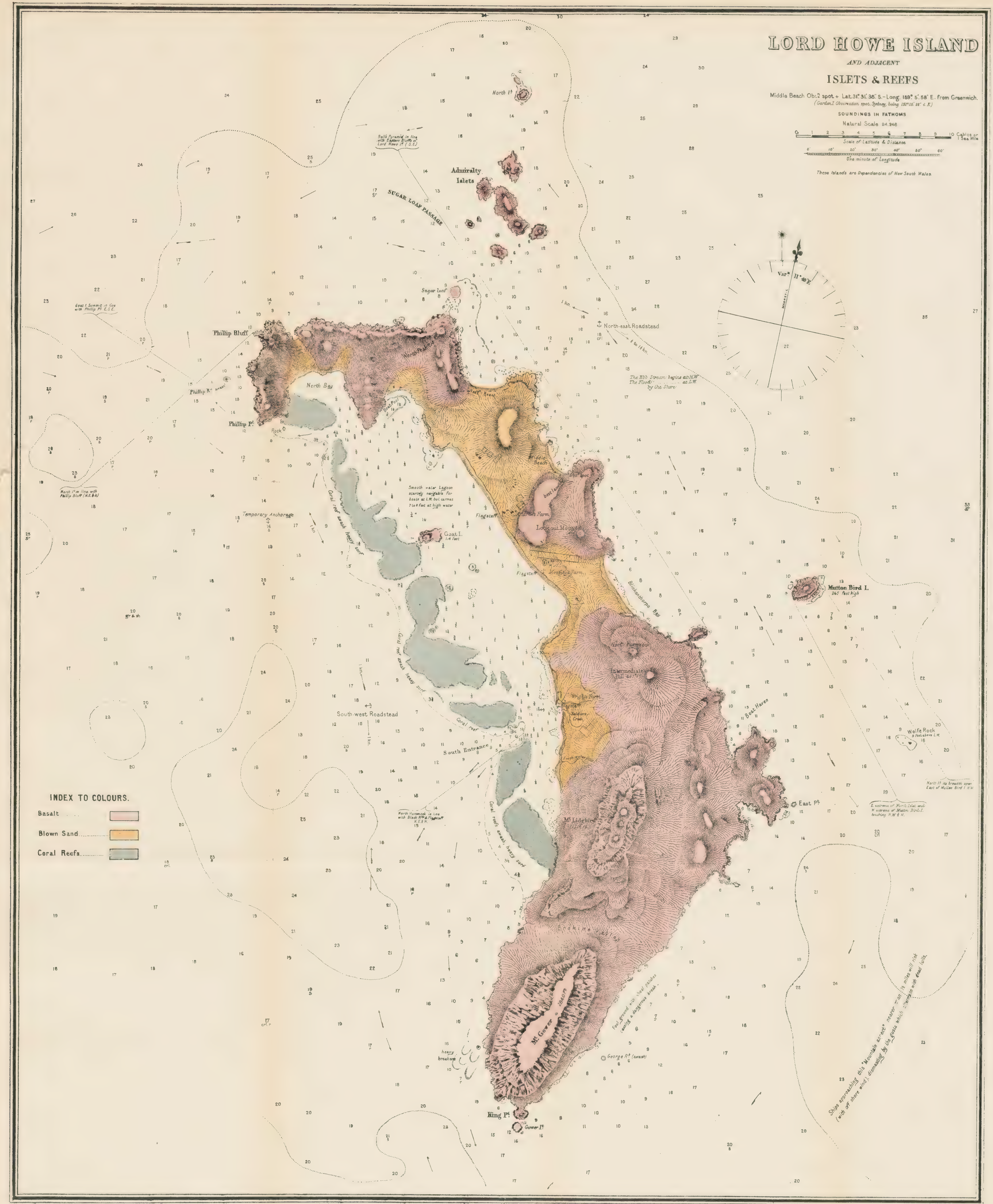

LORD HOWE ISLAND

AND ADJACENT

ISLETS & REEFS

Middle Beach Obs.ⁿ spot + Lat. 31° 31′ 38″ S.–Long. 159° 5′ 58″ E. from Greenwich.
(Garden I. Observation spot, Sydney, being 151° 15′ 28″ & E.)

SOUNDINGS IN FATHOMS

Natural Scale 1/24.248

These Islands are Dependencies of New South Wales.

INDEX TO COLOURS.

Basalt ..... ▨
Blown Sand .... ▨
Coral Reefs .... ▨

0 1 2 3 4 5 6 7 8 9 10 Cables or 1 Sea Mile
Scale of Latitude & Distance
0″ 10″ 20″ 30″ 40″ 50″ 60″
One minute of Longitude
Var.ⁿ 11° 40′ E.
North Iᵈ
Balls Pyramid in line with Eastern Bluffs of Lord Howe Iᵈ (S.E.)
Admiralty Islets
SUGAR LOAF PASSAGE
Sugar loaf
Goat I. Summit in line with Phillip Pᵗ E.S.E.
Phillip Bluff
Phillip Rᵏ awash
Phillip Pᵗ
Rock
North Iᵈ in line with Phillip Bluff (N.E.½N.)
North Bay
North Peak
Boat Pool
Nedᶠ Beach
North-east Roadstead
1 kn.
1 to 1½ kn.
The Ebb Stream begins at H.W.
The Flood " " at L.W.
by the Shore
Middle Beach
Obsⁿ spot
best landing
Flagstaff
Lookout Mound
Goat I. 1.4 feet
Smooth water Lagoon scarcely navigable for boats at L.W. but carries 7 to 8 feet at high water
Temporary Anchorage
Coral reef awash heavy surf
Mosley's Farm
Blinkenthorpe Bay
Mutton Bird I. 265 feet high
Nort. Hummock
Intermediate Hill
Wright's Farm
Soldiers Creek
Fresh water pool
South-west Roadstead
Coral reef
South Entrance
North Hummock in line with Black Rᵏˢ & Flagstaff N.E.½N.
Coral reefs awash, heavy surf
Boat Haven
Wolfe Rock 9 feet above L.W.
North Iᵈ its breadth open East of Mutton Bird I. N.W.
East Pᵗ
E. extreme of North Islet and W. extreme of Mutton Bird I. touching N.W.½N.
Mᵗ Lidgbird
Erskine Valley
Foul ground with shoal patches causing a dangerous break
Mᵗ Gower 2840 Fᵗ
heavy breakers
George Rᵏ (awash)
King Pᵗ
Gower Iᵈ
Ships approaching this "Mountain aspect" nearer than 1½ miles will risk (with off shore wind), dismasting by the gusts which alternate with dead lulls.

(Sig 653-)

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE.
SYDNEY, NEW SOUTH WALES.

3 2044 072 190 838